ENGINEERING NEWS-RECORD

NOV. 24, 1960

PRICE 50 CENTS

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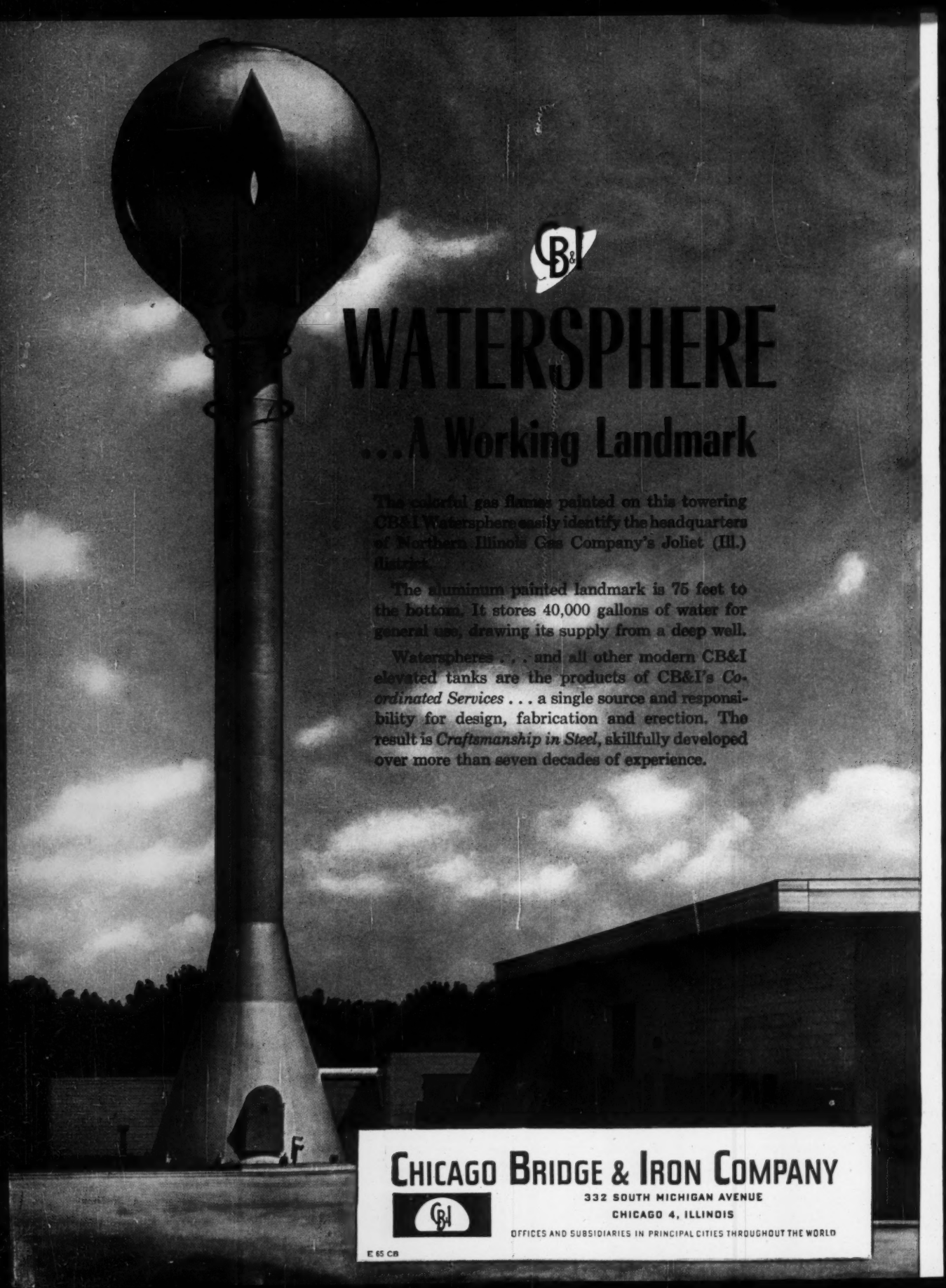

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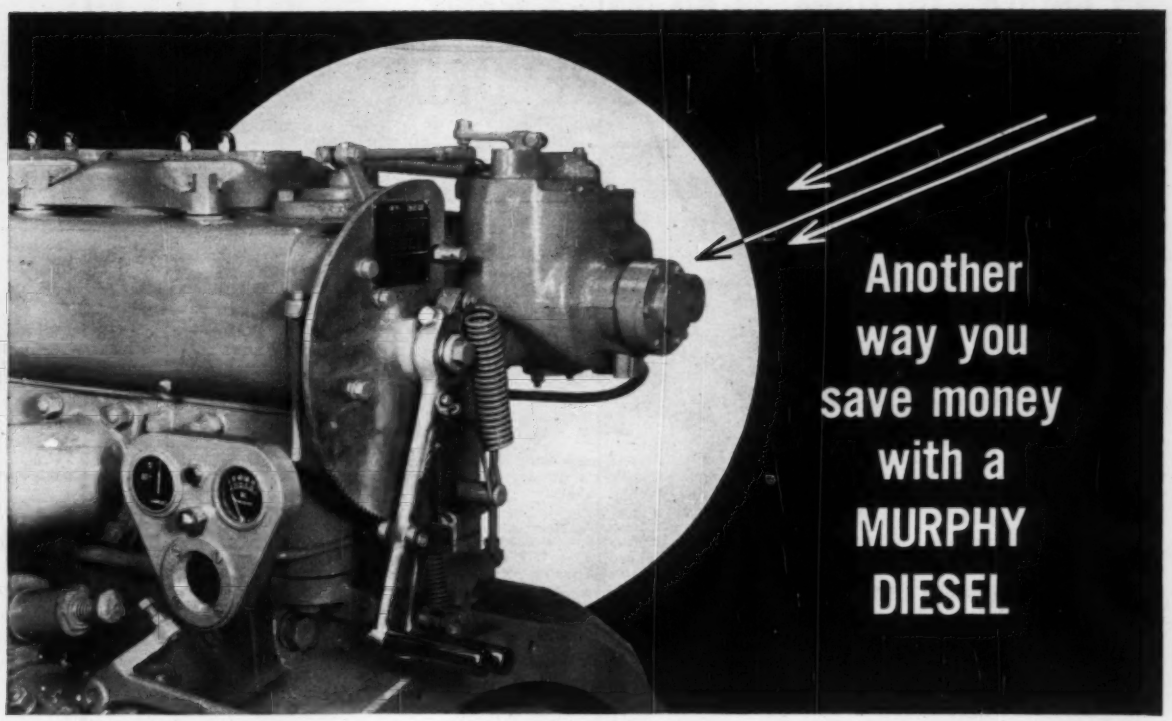

HYDRAULIC SERVO-TYPE GOVERNOR pays off in profit

assures instant response to load change
protects engine from damage

One diesel engine characteristic of prime importance to your operation is the ability to respond *instantly* to varying loads, as well as assure accurate speed control for steady loads. Murphy's Hydraulic Servo-Type Governor utilizes lube oil pressure to adjust injector controls for precise, immediate response throughout the engine's speed range, from idling to full speed. This type of control assures better combustion at all times to save you fuel dollars. It minimizes abnormal operating conditions that cause excessive wear.

An important safety feature . . . If lube oil pressure drops below a safe level, the governor automatically shuts off the engine, protecting it from possible damage.

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UNIT FUEL INJECTORS precisely control fuel injection, permitting "true" diesel operation. Starting is easier and operation smoother.

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Gang forming seemed obvious for this job, but quality of pour was most important. This was to be shear walls from the ground through the 12th floor. McCarthy worked with the Vernon L. Goedecke Company, St. Louis, and the Symons engineering department. Symons engineers recommended a ganged section 20' long x 8' high.

It took 25 days to pour the foundations on the 40 x 600 foot structure and approximately 90 pouring days to bring the building through the 12th floor . . . a total of 196,000 square feet of forming in the walls. 15,000 square feet of Symons Steel-Ply Forms were re-used approximately 20 times.

Complete *housing project story* available on request. Symons Steel-Ply Forms can be rented with purchase option.

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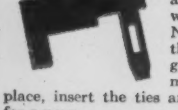

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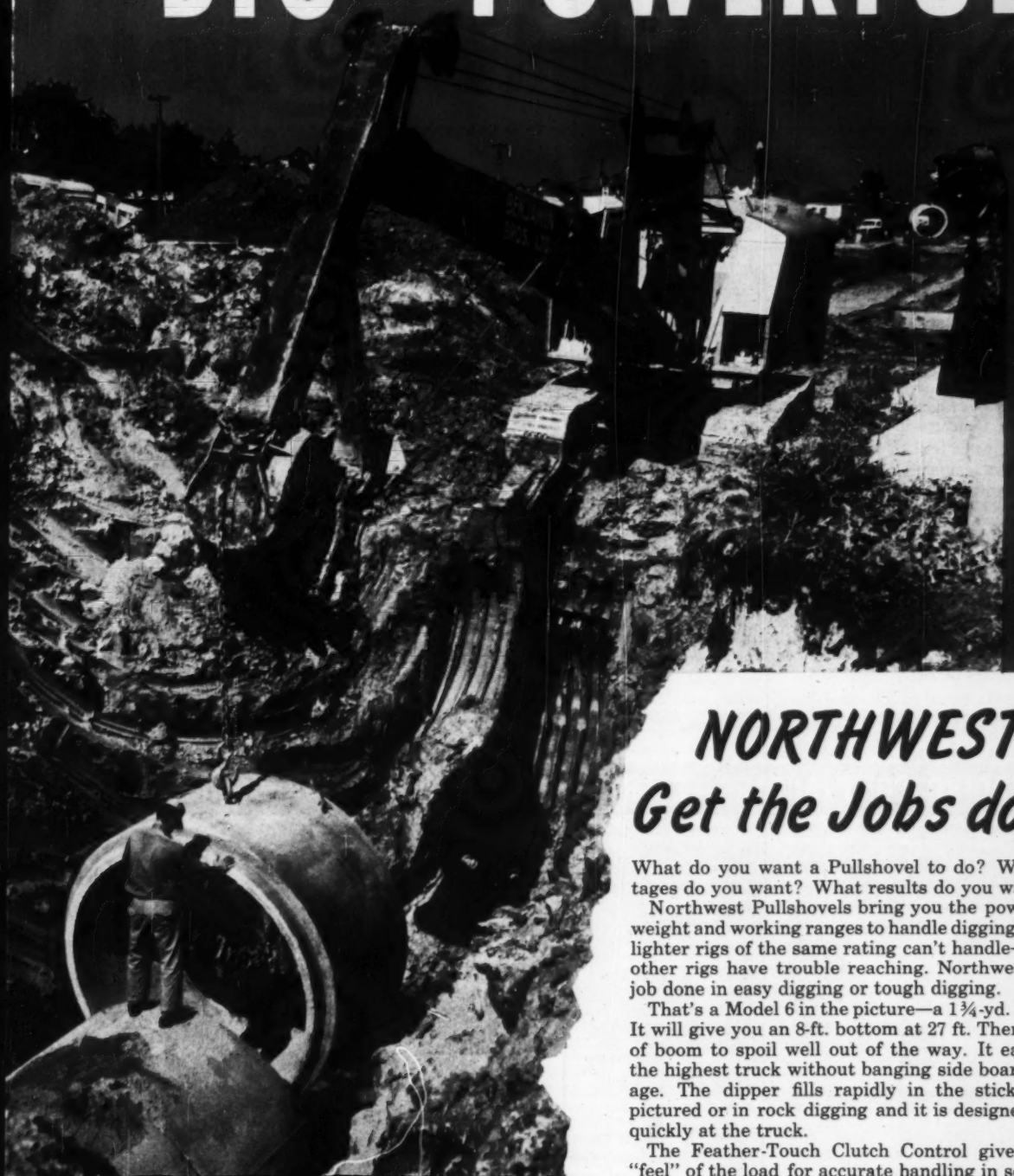

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What do you want a Pullshovel to do? What advantages do you want? What results do you want?

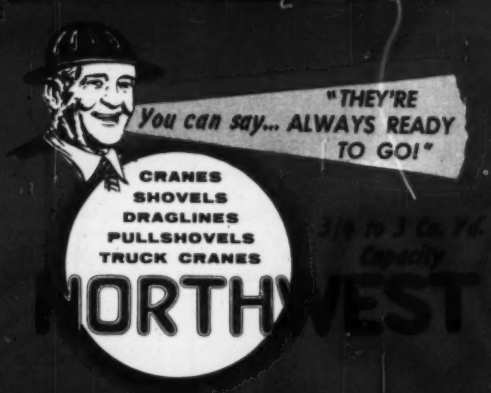
Northwest Pullshovels bring you the power and the weight and working ranges to handle digging that other, lighter rigs of the same rating can't handle—at depths other rigs have trouble reaching. Northwests get the job done in easy digging or tough digging.

That's a Model 6 in the picture—a 1¾-yd. Pullshovel. It will give you an 8-ft. bottom at 27 ft. There is plenty of boom to spoil well out of the way. It easily clears the highest truck without banging side boards or spillage. The dipper fills rapidly in the sticky "going" pictured or in rock digging and it is designed to dump quickly at the truck.

The Feather-Touch Clutch Control gives the true "feel" of the load for accurate handling in setting pipe and Uniform Pressure Swing Clutches run all day, cool and dependable, without jerk or grab. Northwest steering easily negotiates the mucky going so often characteristic of sewer work and has been proved in countless miles of all kinds of travel. These features are typical of all Northwest Pullshovels from the ¾-yd. 25-D to the Model 95.

These things combine to get the job done faster and more profitably. They are the things that make it possible for you to say, "That Northwest is always ready to go." They are the features that make the Northwest the finest machine of its kind.

Details make the machine. It will pay you to dig them out. Ask a Northwest man!



NORTHWEST ENGINEERING COMPANY
Field Bldg., 135 South LaSalle Street, Chicago 3, Illinois

LUBE LOGIC Five ways to

Now's the time for battery check-ups

With cold weather ahead, your batteries will soon work harder than ever. Here's how you can help make sure they're up to it:

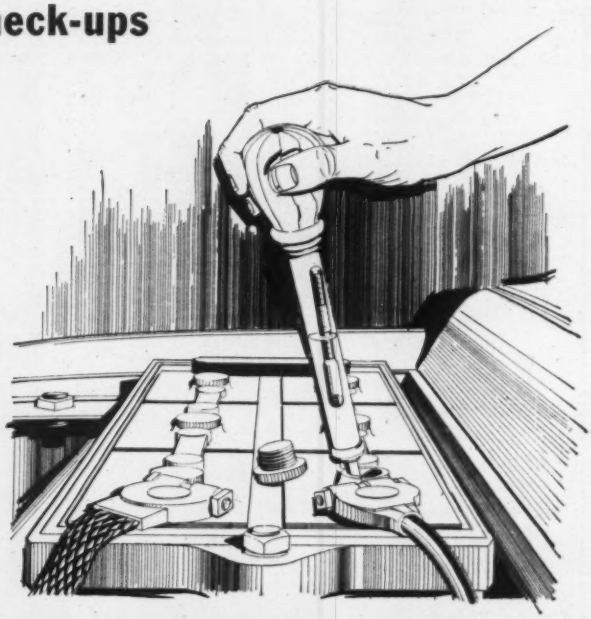
Inspection

- Inspect battery case for cracks and leaks. See that vents in cell caps are open.
- Check battery posts and cable clamps for looseness, breakage or corrosion.
- Using distilled water, bring electrolyte in each cell up to level indicated in cell opening.

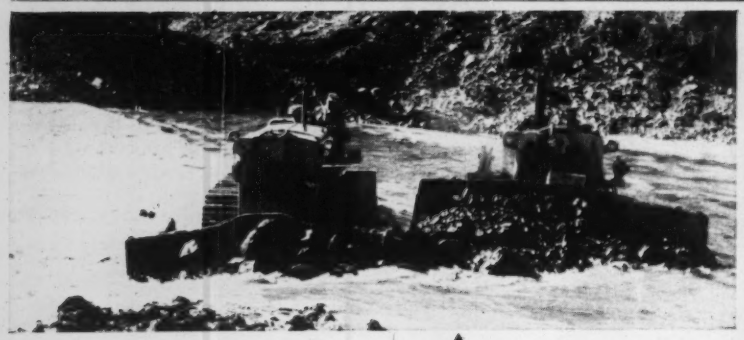
Hydrometer test for specific gravity

- Use a temperature-corrected hydrometer to test the state of battery charge. Make sure battery has not been recently fast-charged, nor water added.
- Draw enough fluid from each cell to raise float off the bottom of the hydrometer tube. Holding hydrometer straight up-and-down, take eye-level reading of the neck of the float. Repeat for each cell.
- Note the temperature, and correct hydrometer reading by subtracting 0.004 from the reading for each 10°F. below 80°F. (Example: If hydrometer reads 1.280, and temperature is 70°F., corrected reading would be 1.280 – 0.004 or 1.276.

Normal state of charge for 12-volt battery is 1.260 to 1.280 specific gravity. For a 6-volt battery, 1.265 to 1.290 specific gravity.



LEADING CONTRACTORS—EVERYWHERE—RELY ON TEXACO LUBRICATION

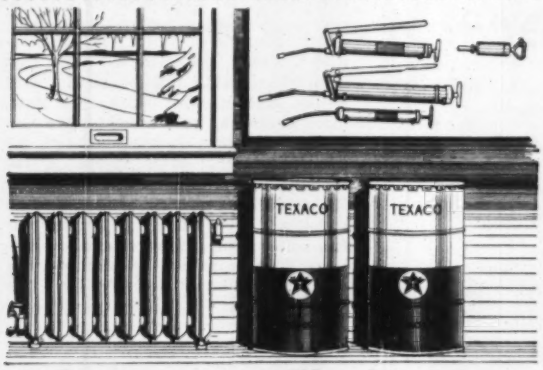


▲ **Isbell Construction Company** bulldozers remove reefs from river channel on Truckee River Flood Control project near Sparks, Nev. Isbell heartily endorses Texaco's Simplified Lubrication Plan.

◀ **Interstate Highway 80 Project** at Colfax, Iowa. Texaco Engineer E. A. Rolwes (right) works closely with Mott Construction Company on the important assignment of keeping equipment on the job and maintenance costs low.

▲ **Ledbetter-Johnson** gouges out largest rock cut (306 ft.) east of Rockies in highway project near Dalton, Ga. This company uses Texaco lubricants to keep their equipment on the job . . . their costs down.

ease winter maintenance



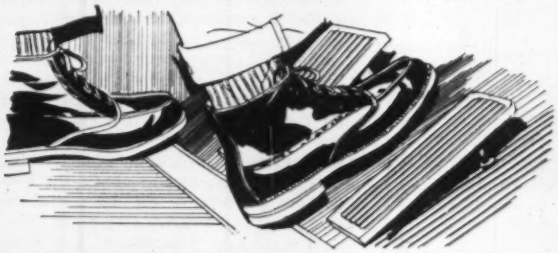
Grease guns like it warm

Store grease guns this way, properly racked to avoid damage, and they'll give you much better service. Incidentally, lubricants like to be stored warm, too.

Warm up the guns if they're too cold to pump the lubricant. Best way is to bring them into a warm place far enough in advance of use. Don't ever attempt to warm them up by direct application of heat.

Save the engine– not the anti-freeze

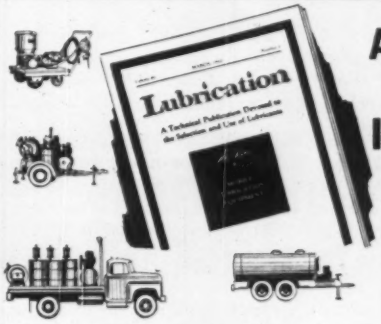
Go slow on using last year's anti-freeze. Although it might still give good protection against freezing, chances are those chemical additives that protect the cooling systems of your engines against rust and corrosion have lost their punch. Your best bet, after draining and thoroughly flushing the radiators, is to fill them up with fresh new anti-freeze — such as Texaco P-T Anti-Freeze.



"Easy does it"... after an oil change

When an engine's crankcase is drained – so is the oil pump's intake sump and pipe. And when the engine starts up, the oil pump must first suck up a lot of air before it starts chewing oil.

To avoid possible damage to the engine, idle it first at low speed. The oil pressure should begin picking up in a matter of seconds and reach normal readings within several minutes. Wait until it does – before you start working the engine.



All about mobile lube rigs

– How to make good lube rigs
– How to use lube records to make rigs more valuable
– Special purpose lube rigs
– Pros and cons of mobile and centralized lubrication

These are just a few of the facts about mobile lube rigs you'll find discussed in the March 1960 issue of Texaco's *Lubrication* magazine. We've devoted the whole issue to it –and we'll send you a copy *free*. Write today to Texaco Inc., 135 East 42nd Street, New York 17, N. Y., Dept. NR-20.

TEXACO LUBRICATION ENGINEERS

From time to time, we'll bring you "sleepers" like these–little angles that can mean big savings in time and money. But for any specific lubrication problem, call on your local Texaco man. He's your *best* source of money-saving lubrication ideas. Remember, "Lubrication is a major factor in cost control."

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Use Northern Gravel for Rapid Sand Filter

Above is the Grand Rapids, Michigan Filtration Plant. W. L. Harris, the Water Plant Supervisor says: "The Northern Gravel Co. has given us excellent service during the more than 20 years that it has supplied our filter media needs. Our laboratory tests have indicated that its products may be depended upon to meet our specifications."

Filter Sand Specifications

are carefully laid out. The Effective Sizes and Uniformity Coefficients used by Consulting Engineers and also recommended by the American Water Works Association are the result of long years of research and experience.

The Northern Gravel Company is equipped to give you prompt shipment whether it be one bag or many carloads, exact to specifications. Filter sand can be furnished with an effective size between 0.35 MM and 1.20 MM.

Chemical Quality

of the filter sand is also important. It must be hard, not smooth, and free of soluble particles. This requires perfect washing and grading facilities. We have every modern device for washing, drying, screening and testing.

Filter Gravel

supporting the Filter Sand Bed must be, in turn, properly graded to sizes calculated to support the Filter Sand, and be relatively hard, round and resistant to solution.

Northern Gravel has no equal in facilities and our reserves of both sand and gravel are inexhaustible. Northern Gravel Company has been in business over 40 years. We guarantee uniformity of products and our records enable us to duplicate your requirements on short notice. Our location is central and we have commodity rates in every direction.

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Box 307

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Reader Comment

Not Holding Back

SIR—Reference is made to the editorial entitled "Don't Withhold Ottawa Data" (ENR Oct. 20, p. 124). By implication at least you have indicated that information is being withheld in regard to the AASHO Test Road. To date, there is nothing to withhold. We will have to await a full analysis of the data before the actual results of the research are reported by the Highway Research Board to AASHO. Certain equations, based on the regression performance rating of pavement test sections, have gone to the Member Departments and to basic AASHO Committees, but as yet it is too preliminary for us to convert the research reports into findings.

We have charged our Transport Committee with developing a recommended Weight and Size Policy that will strike an optimum balance between the best use of highways and the longer life of them, all within the allowable funds available for highway purposes. The Test Road is only supplying one-half of this information and the Highway Research Board is going to supply some of the necessary economic part sometime next month.

The Transport Committee has been working diligently for several months, getting the preparatory work out of the way. On October 26 it held a second meeting with representatives of all the interested industry groups, users, and manufacturers in order to bring them up to date on what is being done, and why, and to obtain the suggestions of industry for the consideration of the Transport Committee.

Our Design Committee has been charged with the responsibility of converting the basic Test Road data on pavement performance in relation to applied loads of given magnitude into design procedure. We will have to wait the full scheduled number of load applications for the basic data that is required. The Design Committee is going to develop an Interim Recommended Standard in the near future, but we will have to await a rather comprehensive analysis of the Test Road and other data before our objective of improved scientific structural design procedures for pavements are ready for the consideration of the Member Departments.

(*Reader Comment continued p. 13*)

Engineering News-Record welcomes expression of opinions from its readers. Comment should be as brief as possible and pertinent to subjects of current construction importance. Letters should be addressed Editor, Engineering News-Record, 330 W. 42nd St., New York 36, N. Y.

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He's ready with On-The-Job Service whenever you need it. Goodyear Contractor Service means that you can have a tire-maintenance program on-the-job. This service is geared to save man-hours, machine-hours and tire life.

Plus — BIG-TIRE PERFORMANCE Example: SUPER ROAD LUG

Jounce it over the roughest terrain and the Goodyear Super Road Lug shrugs off flexing, cuts and piercing blows. Reason? This tire embodies new and advanced super-toughening agents that make it super-tough on wear. What's more, rugged 3-T Processed Cord (nylon or rayon) — triple-tempered by Tension, Temperature and Time — give you unequalled tire strength and stamina.

Why not get the full story on the performance and savings that make the Super Road Lug your best bet for big jobs — and details on Goodyear Contractor Service — *before* your next bid. Just call your Goodyear dealer — or write Goodyear, Truck Tire Department, Akron 16, Ohio. Remember, lots of good things come from Goodyear.

Road Lug — T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

World's Toughest Truck Tires by

GOODYEAR

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

BEST TRACK... BIGGEST SAVINGS

Allis-Chalmers boosts work hours, cuts costs with the best tractor undercarriage in the business. You get industry's toughest track... best designed track guards ... certified, permanently lubricated truck wheels, idlers, support rollers.

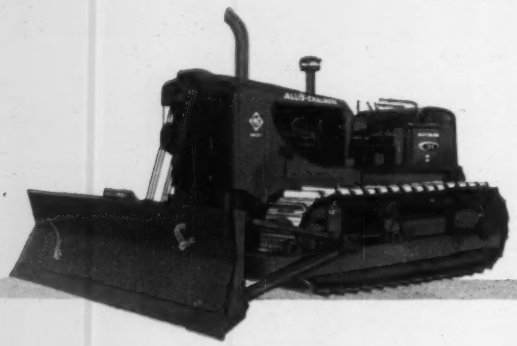
Next time you watch track shoes squeal and grind against jagged rock . . . or see 'em buried sprocket-deep in mud, consider this: Nothing slugs it out with tough conditions like an Allis-Chalmers tractor undercarriage.

Specially heat-treated track shoes, side bars, track pins and bushings are the industry's toughest. Bushings extend into counterbored side bars to seal out dirt, provide more bearing area.

Track guiding truck wheel guards provide a deep-flanged guide channel that keeps track riding true on sprockets, idlers and truck wheels even in the roughest and toughest going. The solid A-frame holds the truck frames in absolute alignment — keeps track running straight.

PERMA-SAFE truck wheels, idlers and support rollers on all Allis-Chalmers tractors roll on tapered roller bearings, are protected against dirt and moisture by Positive Seals. Factory-lubricated, they're certified never to need further greasing.

We invite a maintenance cost comparison with any other tractor undercarriage. We further invite you to inspect the Allis-Chalmers healthy, long-lived tractor engine, the all-steel main frame, double-reduction final drives and many other cost-cutting features. Your Allis-Chalmers dealer will be happy to give you full details. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.



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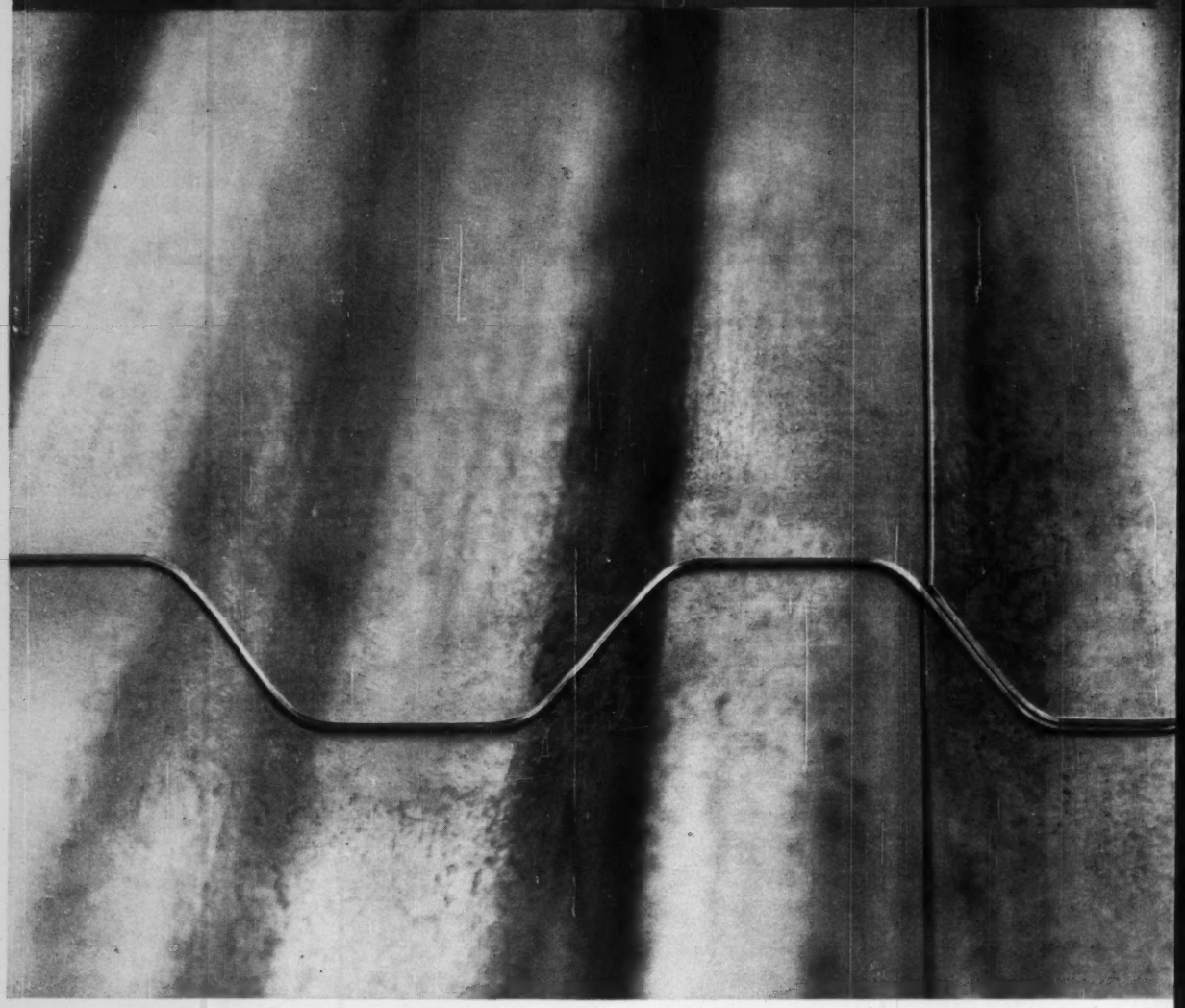
power for a growing world

21

TENSILFORM® BY WHEELING



NEW! MORE UNIFORM SHAPE SPEEDS FLOOR

Now! Here's a stronger, easier-to-use permanent steel base for concrete floors and roofs...and for *both* conventional and light-aggregate concrete. It's *all-new* Tensilform by Wheeling!

A full twenty-five per cent stronger, new Tensilform permits fewer, lighter floor and roof supports ...provides excellent lateral stability for all types of structures.

What's more, Tensilform is produced by Wheeling Corrugating Company, long experienced in the fabrication of corrugated steel sheets and other sheet steel products. So it always has close-fitting corrugations . . . always lays quickly.

You gain many other advantages as well by specifying strong, dependable Wheeling Tensilform as a permanent base for concrete floors and roofs! These include:

- Earlier occupancy because shoring is eliminated

WHEELING CORRUGATING COMPANY

Warehouses: *Boston, Buffalo, Chicago, Columbus, Detroit, Kansas City, Louisville, Minneapolis, New Orleans, New York,*

AND ROOF CONSTRUCTION!

...and Tensilform can be installed in any weather.

- Excellent "U" factors with low initial cost.
- Lower fire as well as extended coverage rates.
- Cleaner construction because precision-formed Wheeling Tensilform cuts cement seepage.

Get the complete story on Tensilform for floor and roof slabs from your Sweet's File. Or write to Wheeling Corrugating Company, Wheeling, West Virginia.

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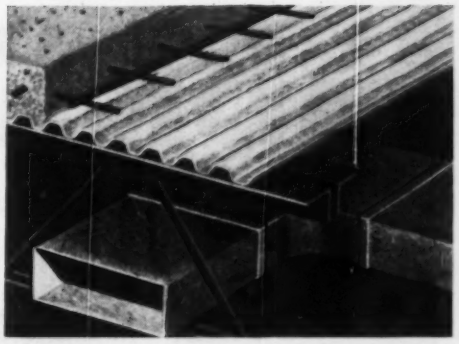

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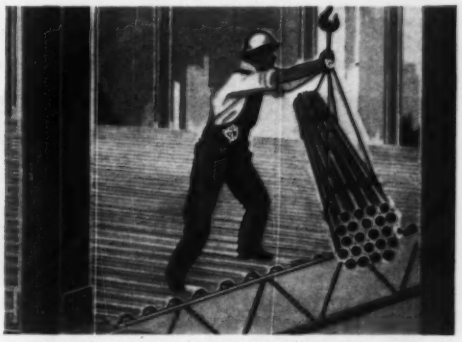
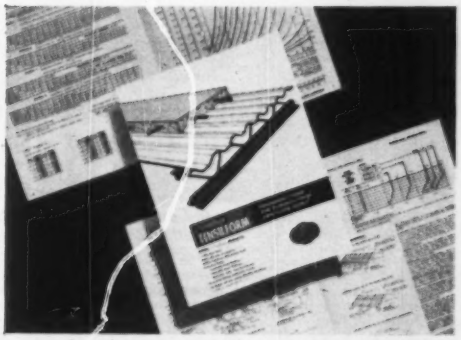


IMMEDIATE, SAFE WORKING DECK! As soon as it's laid, Tensilform speeds construction by providing a sturdy, safe working deck that's used by all crafts.



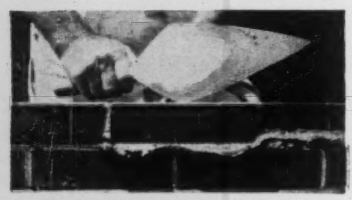
FULL INFORMATION IN YOUR SWEET'S FILE! Our catalog is in Sweet's. It has complete load tables, deflection charts; in fact, everything you'll need to specify Wheeling Tensilform. (Extra copies upon request!)

BRIXMENT

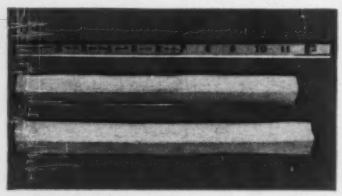
provides the ideal balance of 9 essential characteristics

SOME mortars may be very strong, but lack other important properties such as workability, etc. Other mortars may be very plastic, yet lack necessary qualities such as durability, etc. *For good masonry construction at lowest cost, mortar must have a proper balance of ALL the essential characteristics shown below.*

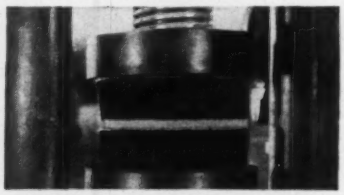
Brixment mortar *does* combine these characteristics, to a higher degree than any other mortar. It is this *combination* of advantages that makes Brixment superior to any mixture of portland cement and lime—and which also accounts for the fact that Brixment has been the leading masonry cement for over 40 years.



PLASTICITY. Mix a batch of Brixment mortar, and a batch of 1-1-6 portland cement-and-lime mortar. Test each mortar by bedding a few bricks. You will find that the Brixment mortar is much more workable.

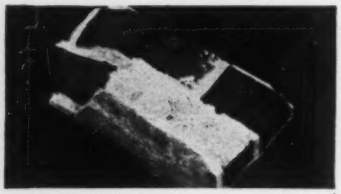


SOUNDNESS. Brixment meets the requirements of the ASTM and Federal specifications for autoclave soundness. This test proves that Brixment mortar does not expand after long exposure to weather.



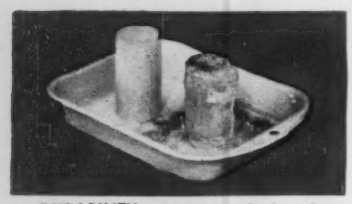
STRENGTH. Brixment exceeds the requirements of the ASTM and Federal specifications for Type II masonry cement. Brixment mortar also meets the requirements of the ASTM specifications for Type N mortar.

LOW EFFLORESCENCE. Cap one brick with Brixment mortar, and another with cement-and-lime mortar. Let cure, then place in pan of shallow water. After a few days you will see that Brixment helps prevent efflorescence.

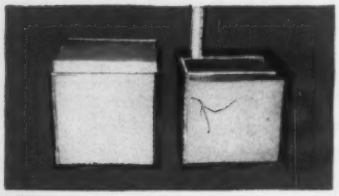


BOND. Brixment mortar's great plasticity and high water retaining capacity permit a more complete bedding of the brick, with greater area of contact between brick and mortar—hence tighter bond.

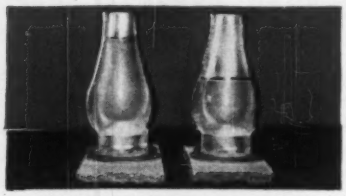
WATER RETENTION. Place a dab of Brixment mortar and a dab of 50-50 cement-and-lime mortar on a brick or concrete block. Wait a minute, then feel each mortar. High water retention makes Brixment mortar stay plastic longer.



DURABILITY. Make a cylinder of Brixment mortar and a cylinder of 50-50 cement-and-lime mortar – cure for 30 days – place cylinders in pan with ¼" of water and freeze and thaw. After a number of cycles, you will see that Brixment mortar is far more durable.



YIELD. Measure out 1 cu. ft. of sand (80 lbs.) and ⅓ bag of Brixment (23⅓ lbs.). Also measure out the same amount of sand and ⅓ bag of hydrated lime (8⅓ lbs.) and ⅓ bag of portland cement (15⅔ lbs.). Make a workable mortar from each batch, then place each batch into a box holding 1 cu. ft. You will find that Brixment mortar gives from 5% to 15% greater yield.



IMPERMEABILITY. Prepare a slab of Brixment mortar, and one with ordinary cement-and lime mortar. After they have hardened, wax-seal a lamp chimney to each slab, and fill with water. After 24 hours you will see that much less water has gone into or through the Brixment slab.

LOUISVILLE CEMENT COMPANY, LOUISVILLE 2, KENTUCKY

Cement Manufacturers Since 1830

. . . Reader Comment

(Continued from p. 6)

Inasmuch as these matters become official policy only after they have been approved by two-thirds of the state highway departments, there is very little that we can release during the development stages.

AASHO is definitely not going to withhold anything.

Every decision, every procedure that we adopt will have the scientific reasons for the action entirely documented. When it is developed and becomes AASHO policy, it will be released to the Member Departments and to all other interested groups in the form of our official publications.

To attempt to make progress reports on findings of the Test Road prior to its completion and completed analysis would be a serious mistake. Both of our Committees that are assigned to interpreting the Test Road results into usable procedures are working as rapidly as conditions and data will permit. There will be no unjustifiable delay in getting material into the hands of the engineers who will use and need it.

AASHO requirements from the Test Road are far more complex than are those of the Bureau of Public Roads 210 Report, inasmuch as the Test Road supplies only a portion of the material involved for that document and the Test Road trends, by the time that Report goes to the printer, will be adequate for the purpose.

DAVID H. STEVENS, *President*
A. E. JOHNSON, *Executive Secretary*
American Association of State Highway Officials
Washington, D. C.

For Your Calendar . . .

American Association of State Highway Officials, annual meeting, Sheraton-Cadillac Hotel, Detroit, Mich., Nov. 27-Dec. 2. Write: A. E. Johnson, 917 National Press Building, Washington 4, D. C.

American Society of Mechanical Engineers, 24th National Exposition of Power and Mechanical Engineering, New York Coliseum, New York City, Nov. 28-Dec. 2. Write: E. K. Stevens, 480 Lexington Ave., New York 17, N. Y.

Industrial Building Exposition & Congress, New York Coliseum, Dec. 12-15. Write: Clapp & Poliak, 341 Madison Ave., New York, N. Y.

National Bituminous Concrete Association, annual convention, Shamrock-Hilton Hotel, Houston, Tex., Jan. 28-Feb. 1, 1961. Write: National Bituminous Concrete Association, 1145 19th St., N. W., Suite 218, Washington 6, D. C.

American Society of Civil Engineers, regional convention, Houston, Tex., Feb. 19-23. Write: E. P. Segner, Jr., Texas A&M College, Civil Engineering Building, College Station, Texas.

American Concrete Institute, annual convention, Chase-Park Plaza Hotels, St. Louis, Mo., Feb. 20-23, 1961. Write: American Concrete Institute, P. O. Box 4754, Redford Station, Detroit 19, Mich.

American Road Builders Association, annual convention, Haddon Hall, Atlantic City, N. J., March 5-8. Write: Norman T. Almquist, World Center Building, Washington 6, D. C.

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... versatility

Two advantages of using steel joists are readily apparent in this printing shop: wide, column-free expanses of floor space, easy solution to placement of ductwork, pipe, and conduits.

Five good reasons for designing with Steel Joists

EASY TO INSTALL UTILITY SERVICES

The open webs in Bethlehem Steel Joists allow for the passage of pipe, wires—even heating lines—in any direction. The open webs also greatly simplify installation of conduit and wiring for recessed lighting fixtures.

FIRE-RESISTANCE

Steel joists in combination with floor slab and plaster ceiling form a barrier with up to four hours' fire-resistance, depending on slab thickness and the type of plaster. And greater fire-safety is of particular importance in multi-story buildings such as hospitals, apartments and schools.

NON-SHRINKING, NON-WARPING

Building maintenance is greatly simplified when you design with joists. They provide non-shrinking, non-warping construction which eliminates sagging floors and cracked ceilings.

COLUMN-FREE SPACE

Steel joists are ideal for long spans such as auditoriums, gymnasiums, garages, stores. And in any building they give a maximum of column-free space.

Steel joists arrive at the job site fully fabricated, ready for immediate placing.

FAST, ECONOMICAL CONSTRUCTION

Joists arrive at the job fully fabricated and tagged, ready for immediate placing. Two men can easily place small joists, and a simple derrick lifts the larger sizes.

These are some of the important advantages you get when you design with Bethlehem Open-Web Steel Joists. Bethlehem Joists are fully approved by the Steel Joist Institute.

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Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

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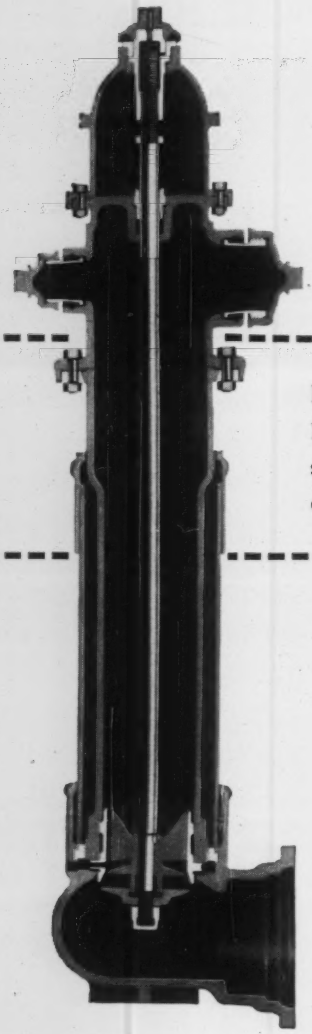
ONLY MATHEWS HAS ALL THE DESIRABLE FEATURES



What do you look for in a hydrant? Dependability... replaceable barrel?... conventional packing?..."O" ring seal?...stop nut to prevent stem from buckling? We could double this list and still not cover all the features we build into Mathews Hydrants *by design.* Mathews has them all.

DEPENDABILITY

Mathews Hydrants are always ready for service, because their design is fundamentally sound and simple. In 90 years we have never changed the basic design—only refined it, by detail.

AND ALL THESE OTHER FEATURES, TOO: All working parts contained in replaceable barrel • Head can be faced in any direction • Replaceable head • Any nozzles you specify • Nozzle levels raised or lowered without excavating • Leakproof because stuffing box is cast integral with nozzle section • Operating thread only part requiring lubrication • Protection case of "Sand-Spun" cast iron for strength, toughness, elasticity • With bell, mechanical joint or flange pipe connections

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Manufacturers also of Mathews Flange Barrel Hydrants, R. D. Wood Hydrants, R. D. Wood Gate Valves, and "Sand-Spun" Pipe (centrifugally cast in sand molds)

ENGINEERING NEWS-RECORD

Vol. 165, No. 21 November 24, 1960

Number of copies printed in this issue 86,760

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Back issues of ENGINEERING NEWS-RECORD *are generally available for the previous six months. Semiannual indexes will be sent on request.* ENGINEERING NEWS-RECORD *is also indexed in Industrial Arts Index and Engineering Index.*

THE CONSTRUCTION WEEK

BOOM IN BANKRUPTCIES—Business failures in construction will hit a record this year. In October, 231 builders went bust, bringing the total for the first 10 months to 2,134, only 28 under the record for the full year 1958. Figures for November and December are sure to set a new high for a full year.

BIG QUESTION—Could the Malpasset Dam failure have been avoided? One member of the team of experts that investigated the failure confirms earlier reports that bad rock in the left abutment was the cause. But, he says, this could have been detected before construction. Spokesmen for Coyne and Bellier, designers of the dam, say any speculation before release of the still-secret report is premature.

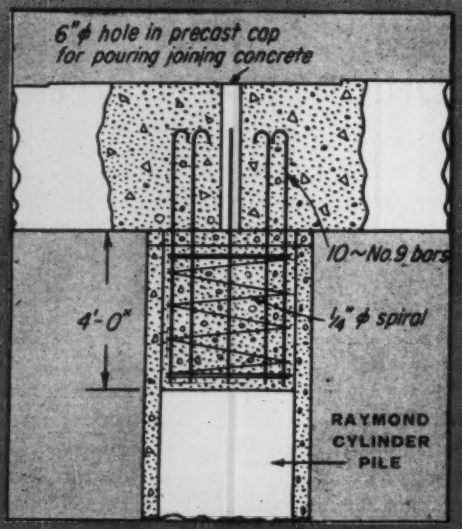
CITIES CZAR?—John F. Kennedy is expected to combine all federal activity in the field of housing and redevelopment into a Department of Urban Affairs, with Cabinet status. In the running to head the new department: Mayor Richard Lee of New Haven, Mayor Richardson Dilworth of Philadelphia and Governor David Lawrence of Pennsylvania. All have successful records in the redevelopment field. (Governor Lawrence presided over Pittsburgh's rebuilding.)

TOO BIG FOR HIS BID—The Bureau of Reclamation last week awarded a dike construction contract to a firm that bid 2% higher than the low bidder. Reason: Low bidder, Engineers & Contracts, Inc. of Provo, Utah, did not qualify as "small business." Its average annual revenues in the last three years topped $5 million. Contract went to Thorn Construction Co., Inc. of Provo, which bid $265,079.

NO THREAT—The U.S. will not curb imports of large steam turbine-generators. General Electric Co. and Westinghouse Electric Co. had contended the imports threatened national security by injuring domestic productive capacity that would be needed in case of mobilization. Not so, ruled the Office of Civil and Defense Mobilization. OCDM recently ruled similarly against curbs on imported hydroelectric turbine generators.

FAST-MOVING CATERPILLAR—Caterpillar Tractor Co. boosted sales and profit margin last month. Sales hit $51.1 million, 2% ahead of the strike-crimped figure last October; and profit jumped to 6.9% of sales—last October's profit was a nervous 1.05%.

NEXT QUESTION, PLEASE—After gazing at the five-mile-long, $100-million Mackinac Bridge, a sightseer stumped the Michigan Highway Department's Tourist Information Center with this question: "Why did they build such a big, beautiful bridge in such a small town as Mackinaw City? Why didn't they build it in Chicago where more people could admire it?"



HOW RAYMOND PRESTRESSED PILES ARE TIED TO PRECAST CAP

PONTCHARTRAIN TO PENSACOLA:

RAYMOND and the case of the traveling bridge

From an assembly line two hundred miles away, thousands of Raymond prestressed concrete cylinder piles were floated to the site of the new $8,000,000 Pensacola Bay Bridge.

Because of tricky bottom conditions many of the 54-inch Raymond piles—enough to support about 3,000 feet of the bridge—were built to a length of 164 feet, quite probably the longest ever used for a bridge in this country. The precast, prestressed deck slabs reach a span of 60 feet and weigh about 156 tons apiece, providing twin roadways, each 26 feet wide.

Much time, meaning much money, was saved by using these post-tensioned Raymond piles, even though they had to be barged for 200 miles from the yard in Mandeville, La. Incidentally, this yard was set up originally to fabricate the same type of Raymond pile for the magnificent Lake Pontchartrain Causeway.

It is this quality, derived from long experience and creative engineering ability, that Raymond offers as stock-in-trade. Foundations often present unusual problems and we are equipped to handle most of them, however large or small, on land or under water. May we be of help to you? Just call or drop a line to any of the Raymond offices here or abroad.

DESIGN AND SUPERVISION: Engineering Staff, Florida State Road Dept. CONTRACTORS: a joint venture of Brown & Root and T. L. James, Inc.

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WASHINGTON OBSERVER

- **Navy switches telescope designers**
- **PHS happy about success of sewerage bonds**
- **Tallamy to resign soon**

● **The Navy has changed design contractors for its 600-ft-dia radio telescope at Sugar Grove, W. Va.** By "mutual agreement," says the Navy it terminated its contract with Grad, Urbahn and Seeley early this month. The Navy brass is now negotiating with Ammann and Whitney—who have been consultants on the project—to complete the structural design. Estimated size of the contract: about half a million dollars. A contract with Battelle Memorial Institute for specialized work is being extended.

Design and funding problems have already caused a two-year delay. The telescope is now set for completion in 1964.

According to unofficial reports, the Navy wanted to make numerous design changes in the structure without increasing the $5.8-million agreement it had with Grad, Urbahn and Seeley. The firm had reportedly completed almost 90% of the design work; Navy settled the contract at $5.2 million.

Basically, Navy wants to cut the weight of the structure through new designing and a shift to high-strength steel in part of the telescope. Taking some of the control elements off the structure and putting them on movable ground installations would reduce the weight further.

—

● **Government pollution officials are happy over the way the voters made their enforcement job easy.** Public Health Service chiefs will report these good tidings to President Eisenhower's pollution conference, meeting in Washington next month:

Voters approved $132 million for anti-pollution construction. In Kansas City, Mo., they voted $75 million; Kansas City, Kan., $15 million; Omaha, Neb., $11 million; and Portland, Ore., voters increased sewer-use charges to put its $7-million program on a pay-as-you-go basis.

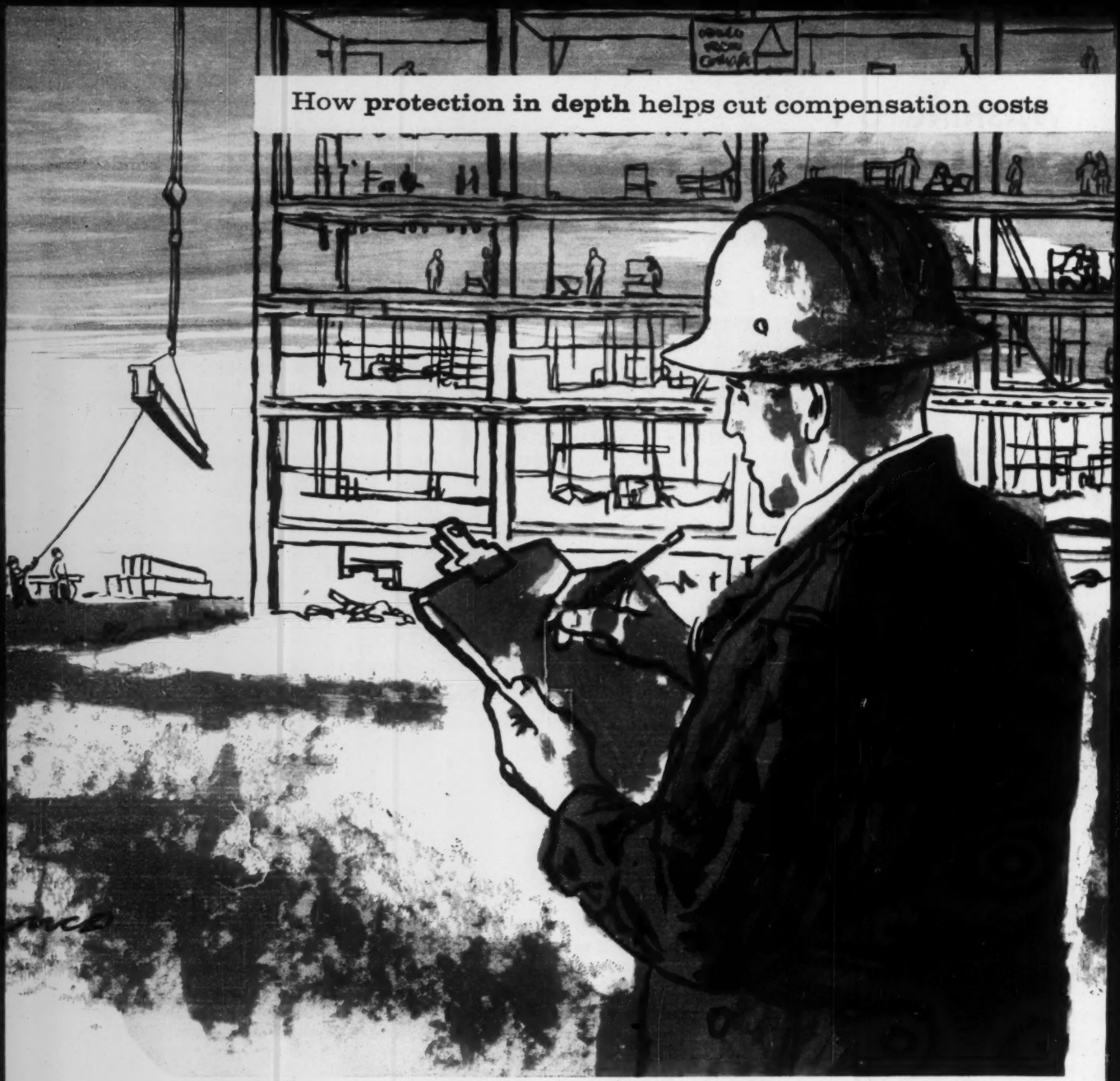
All public bodies in the Kansas City metropolitan area are now in a position to comply with the May 1 enforcement deadline established following a hearing last June. The only remaining holdout to control of sewage and industrial wastes into the Missouri is St. Joseph, whose officials are now in court as defendants in an enforcement suit. However, 18 industries there are going along with the federal agency's program.

—

● **Highway Administrator Bertram D. Tallamy will become a consultant in Washington shortly after the first of the year** when he resigns as Federal Highway Administrator.

Mr. Tallamy says he probably would not remain in his present post even if the incoming Kennedy Administration asked him to. Mr. Tallamy told ENR that, after getting the highway program well under way, he now wants to devote some time to his personal affairs.

How **protection in depth** helps cut compensation costs



Every hazard he spots can save you money

Contractors who insure with Liberty Mutual value the aid of a Liberty loss prevention engineer. His practiced eye sees hazards that others might miss. He learns every phase of your operation, understands your job plans and problems. Briefed in advance, he can help you reduce accidents and losses, keep your compensation costs down and improve worker efficiency. Safety engineering is but one of the many Liberty Mutual services that add up to protection in depth. To learn more about Liberty's protection in depth and how it can help lower your business insurance costs, get in touch with your nearest Liberty Mutual office.

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U. S. Transportation Is in Trouble

A strike of bus and trolley mechanics at Los Angeles' Metropolitan Transit Authority last week pulled the rug from under 400,000 commuters. Many of them decided to use their own cars to get to and from work and school. This turned the area's normally chaotic traffic situation into a rubber-tired nightmare.

More than 65% of the Los Angeles area is devoted to parking lots, garages, streets and highways—but parking lots were jammed to the curb and cars ran bumper-to-bumper.

Motorists attacked lot operators with fists in an attempt to win parking space. Motorists caught in traffic could do nothing but listen to overheated cylinder heads crack.

Los Angeles County has more registered vehicles than 43 of our 50 states—2.4 million automobiles and 321,000 trucks. And the area seemed on the verge of that day when the introduction of one car too many would create the unbreakable traffic jam, the day when all the stalled automobiles would have to be paved over so that people could start all over again.

But Los Angeles isn't unique.

The nation's transport system is—to put it bluntly—in a mess.

Rush-hour traffic congestion in our cities threatens to become intolerable.

The death rate on the nation's highways and property losses from accidents are a national disgrace.

Mass transit in urban areas has deteriorated badly. In many cases service is poor, equipment outdated, seating space limited.

Airports and airspace over them have become dangerously overcrowded.

Railroads and the merchant marine are in financial distress because of heavy losses of traffic. Common carrier traffic generally has suffered severe erosion from the phenomenal growth of private truck fleets, privately owned automobiles and business aircraft.

Much of the nation's transportation equipment is obsolete or poorly adapted to today's needs—despite dramatic developments in new engines and fuels, in powered flight, in automated traffic control and navigational aids.

Los Angeles expressways looked like parking lots last week.

This picture of the nation's transportation problem has been pulled into focus in an 88-page report released by the National Research Council of the National Academy of Sciences. The report is based on conclusions reached at a three-week study conference at Woods Hole, Mass. (ENR Aug. 4, p. 15), by 150 private, government and university transportation specialists; physical and social scientists; economists, lawyers and urban planners. The conference was held under the auspices of the National Research Council with

. . . Technological change is slowed by financial and labor problems

financial support provided by the Rockefeller Foundation, the National Science Foundation and the Office of Civil and Defense Mobilization.

The group's main purpose was to review the status, performance and potentials of the transportation system and to identify problems in need of intensive research. Its conclusion: The transportation system has grown up so haphazardly, often without full realization of its economic, social and cultural impact, that it is in need of almost total review.

The group worked with the broadest possible definition of the transportation complex. It described this as the "totality of vehicles, ways, terminals, supporting facilities and personnel required to achieve the movement of people and goods within and across the borders of this nation. It comprises also the institutional arrangements, the industrial complex and the public policies by means of which the physical facilities and the manpower are brought together into an operating system."

Here is a summary of the group's findings:

Total U. S. transportation effort represents an expenditure approaching $100 billion per year and the consumption of an estimated 45% of the nation's total expenditure for energy. Within the next two decades, demands for freight transport alone may rise with the growth in population by as much as a trillion ton-miles over the country's present levels.

Unless transportation keeps pace, it will have a drag effect on the growth of the economy. Efficient production and distribution, effective use of resources, the greater mobility of the population, success in community planning—all these will depend on how well the transportation system functions.

Although it is the best in the world, U. S. transportation is not adapted properly to today's needs—let alone future needs. Technological developments, existing or on the horizon, could greatly benefit all modes of transportation—but only if solutions can be found to present problems.

What are these technological innovations?

- Atomic and nuclear energy, which will open the way from a possible shortage of motive energy to an energy-rich world economy.
- The return of electric propulsion for both railroads and motor vehicles in the not distant future, with electricity produced not only by atomic but solar energy.
- Gas turbine engines, which will greatly reduce power transmission problems as compared with reciprocating engines.
- Use of pipelines and belt conveyors to move solids and bulk items at low cost.
- Vertical take-off airplanes.
- Use of high-speed, air-breathing ram-jets to supplement turbo-jet air power and provide both supersonic passenger and cargo planes with speeds three and four times the speed of sound.
- Hydrofoil ships, which will skim over the top of water.
- Automobiles that ride on a cushion of air over both paved and unpaved roads, rough terrain and water.
- Automatic and crewless railway and subway trains.
- Automatically controlled highway vehicles.
- Automatic pilots and air traffic control.

Utilization of these technological advances is slowed by staggering financial problems, labor opposition to automation and the inertia of legislative and regulatory bodies.

In addition, the various modes of transportation lack research and engineering facilities to adapt the technological innovations.

There are numerous other problems retarding transportation development:

- Government transportation policies, particularly on the federal level, are a hodgepodge. At least 30 executive agencies, including regulatory agencies, now make decisions and carry on activities affecting transportation in one way or another—all with relatively little coordination.
- Statistical information and other data about transportation are elaborately detailed in some areas but completely void in others.
- Transportation has not kept pace with the changing living patterns of Americans. In particular, surface transportation has not been adequately coordinated with the shifting patterns of urban development.

What is the solution to these problems? In essence, the study group said, it is better research, planning and policy-making.

The group particularly urged that the vast transportation complex be subjected to systems analysis as a means of dovetailing it into the larger framework of the national society and economy it serves.

Systems analysis is a comparatively new research tool, making use of electronic data-processing equipment. The operations of a system, its problems and varying alternatives of solution are all expressed mathematically. The systems analysis procedure comes up with the best solution, which is then tested by a pilot experiment.

The study group also recommended that the government consider a unified transportation policy, which will govern all modes of interstate transportation, rather than letting separate and sometimes conflicting policies develop among a host of separate agencies with different functions.

It called for broader community planning, relating transportation needs to research on future growth patterns and social and industrial trends at work.

Philadelphia Spreads Rail Bargain

Philadelphia will extend bargain-fare rapid transit service to three additional areas this month and next in its campaign to lure motorists from their automobiles into rail transportation.

Subsidized commuter service will go into three suburban areas with a total of 56,000 families on a two-month trial basis.

Philadelphia will pay the subsidy for the inclusion of the Main Line and suburban communities.

Two of the services are along the Pennsylvania Railroad's Manayunk and Torresdale lines. The third is on a Reading Co. line in the northwest section of Philadelphia.

Philadelphia officials hope the benefits derived during the two-month trial period will induce these areas and other suburban communities to participate in a regional approach to commuter rail service problems.

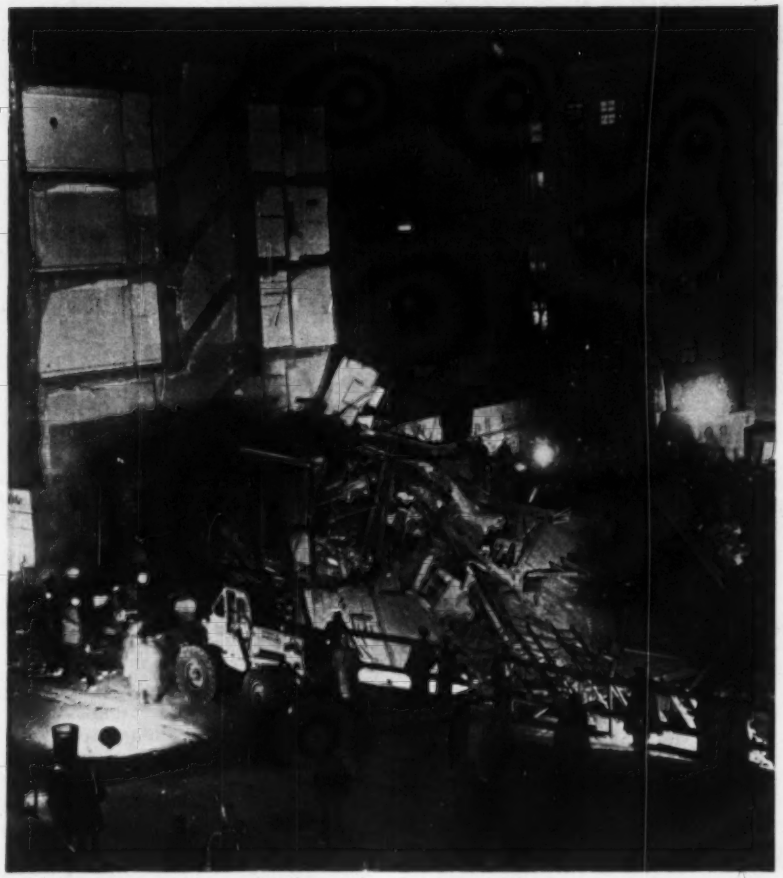
In addition to cut-rate fares, the program also offers 10-cent transfers good for combination Philadelphia Transportation Co. bus, trolley and train rides to and from the stations.

Previous successful attempts at inducing Philadelphians to use rapid transit by offering bargain fares were Operation Northeast and Operation Northwest (ENR Oct. 13, p. 42).

Passenger Service Improvement Corporation of Philadelphia, non-profit organization of prominent citizens and representatives of city government, the railroads and railway unions, sponsors the city-subsidized commuter program.

The city's Urban Transportation Traffic Board says the cost to the city for freeways for automobile travel, including traffic control devices and police services, runs to $100 per year per passenger. So far, the subsidy per passenger on Operation Northeast is only $32 per year per passenger.

Passenger Service Improvement Corp. will eventually take over the functions of UTTB in planning rail transportation service in Philadelphia's metropolitan area.



Rubble obscures cause when . . .

Tenement Falls Into Excavation

A five-story tenement collapsed into the excavation of an apartment project in New York City last week leaving only a pile of clothing-strewn rubble to mark its site.

Collapse of the masonry, wall-bearing building came only minutes after 10 occupants were routed out of their apartments. No one was injured. A series of loud reports—one witness said it sounded like rifle fire—and clouds of dust from cracking plaster were the only warnings before the collapse.

City building officials at the site said the collapse probably wasn't caused by the building activity next door. But Deputy Commissioner of Buildings William Kane commented, "These buildings (most are only 25 ft wide) were built in the 1870s and '80s; they hold each other up."

The building that went down was originally built as a one family residence but was later converted to apartments with a store constructed on the ground floor.

Mr. Kane said that until a complete investigation is made the Building Department can't be sure what caused the collapse.

The pattern of debris indicated a fall toward the front into the street as well as to the side into the excavation. Building officials will study condition of the old footings after the rubble has been cleared away.

The project next door is a 20-story reinforced concrete apartment house. Glickman Corp. of Nevada, with offices in New York City, is the owner-builder. Stanley Broff of Glickman Corp. said the 8-ft-deep portion of the excavation adjacent to the demolished building hadn't been worked for a week. "No shores were required against the building there," Mr. Broff said. "We were about 2 ft 6 in. above their footings." D'Aquila Bros., Long Island City, N. Y., is the excavating contractor.

Excavation had reached a depth of about 20 ft at the opposite end of the 175-ft-long site when the collapse occurred. No blasting or pile driving was involved in the work. The site is on 34th St., a crowded artery feeding heavy traffic across mid-Manhattan.

Big Building Parts

BRI conference reviews trend in prefabrication

The 1960 Building Research Institute Fall Conference, held last week in Washington, D. C., placed heavy emphasis on analysis of the trend to preassembled components for building construction. Structural, electrical and mechanical assemblies were examined by more than 20 speakers.

Other sessions dealt with fasteners for industrial curtain walls, need for new building research and properties of foamed concretes, plastics and metals. A joint session with the American Society for Testing Materials Committee E-6 was held on test methods.

Most of the speakers called attention to a need for larger building components. (Wall panels, said one, should be at least room size.) The objective is to reduce on-site labor and erection time and to assure high quality of product.

Carl Koch, Cambridge, Mass., architect, said better value should be required of prefabricated components: "There are too many places where the architect can point to factory-produced products where all the savings obtained from machine operations are eaten up in large overhead selling and distribution costs, resulting in very little saving under conventional on-site construction."

Mr. Koch also called for real integration of structure and equipment. "The present reluctance of most product manufacturers to accept responsibility for more than a single product makes it very difficult to assure the efficient working of the complete building."

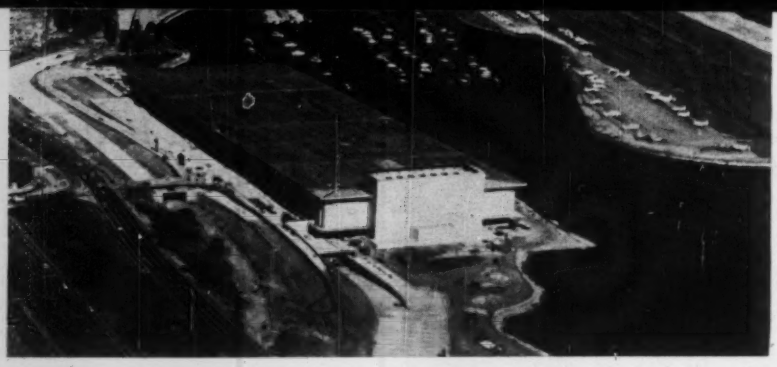
R. J. Short, director, engineering exploration, The Proctor & Gamble Co., Cincinnati, pointed to the need for reducing construction costs, which, he said, have been rising much faster than those for mass produced items.

Misappropriation Charged To State Road Officials

North Carolina's State Bureau of Investigations is investigating alleged misappropriation of state property by some officials of the state's highway department.

The bureau is acting on affidavits from three former employees of the department who have sworn that they reported irregularities to a department head and subsequently were asked to resign or be fired.

The affidavits allege misappropriation of hundreds of pounds of grass seed and fertilizer, hay, pipe and wire. They also imply that a highway official used state employees on a private landscaping job.



Chicago Exposition Hall Opens

Climaxing a driving 23-month construction program, Chicago's $35-million lake front exposition hall, McCormick Place, opened last week with the 1960 Modern Living Home and Flower Show.

McCormick Place is a four-level structure 1,110x360 ft in plan and enclosing 36 million cu ft of space.

Structural framing is part steel, part reinforced concrete, with a poured gypsum roof. Exterior walls are precast concrete. Steel piles driven to bedrock support the foundations.

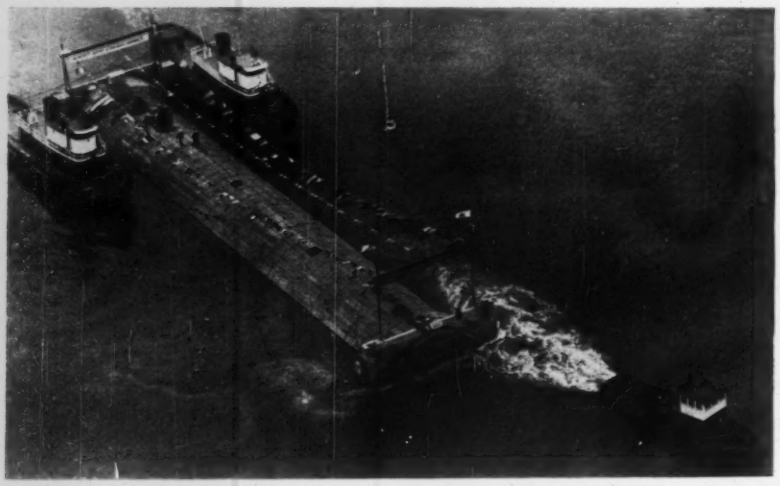
The main exhibition area at the second floor level has a total net area of 320,000 sq ft. Its reinforced concrete floor is designed for a live load of 400 psf and is supported on concrete columns. A lighting intensity of 50 ft-c is provided near floor level.

Transverse roof trusses span 210 ft between two rows of steel columns and cantilever 65 ft at each end to give maximum unobstructed exhibition floor area below.

Minimum ceiling height below the trusses is 30 ft.

The Metropolitan Fair and Exposition Authority received bids for the exposition hall in December 1958. Gust K. Newberg Construction Co. was awarded the general contract. The roof truss system, containing 7,000 tons of structural steel was topped out by the American Bridge Division of U. S. Steel last March 24.

Alfred Shaw was the chief architect; Carl A. Metz, Shaw's partner in Shaw Metz & Associates of Chicago, was structural engineer. Edward J. Lee is general manager.



Tunnel Tube Sails to a Sinking

A flag-decked concrete cylinder, 200 ft long and 37 ft in diameter, eased out into the torpid waters of the Inner Harbor, between Oakland and Alameda, Calif., destined for a quick trip to the bottom.

This was the first of twelve 5,500-ton cylinders that will make up the two-lane Webster St. Tube, an underwater link between Oakland and Alameda.

The new $17-million traffic tube will run parallel to the 33-year-old Posey Tube, which now carries two-way traffic between the two cities. When the Webster St. Tube is completed, each tube will carry two lanes of one-way auto traffic. Pomeroy-Bates and Rogers-Gerwick are building the tunnel under a joint venture for the state highway department.

High Dams Downed

New 25-ft limit threatens Tacoma's hydro projects

Tacoma (Wash.) City Light Co.'s Cowlitz River hydroelectric project, in and out of court since 1953, appears headed back before the bench.

An initiative passed by Washington voters seeks to bar construction of all dams over 25 ft high on the Cowlitz and other streams tributary to the lower Columbia, with certain exceptions.

Officials of the State Sportsmen's Council, who sponsored the initiative, said during the campaign that they would not seek to halt the utility's Mayfield Dam, already under construction as the first part of the 460,000-kw Cowlitz project, nor would they seek to impede construction of the second dam at Mossyrock, definitely programmed for construction. Nevertheless, Mossyrock seems the obvious target of the initiative.

Back in 1956, construction of Mayfield Dam came to a halt under pressure from fish and game interests. For three years nothing got done. Now more than 60% complete, it will continue as scheduled, city officials say. They also insist that the utility has the "legal right to proceed" with construction of Mossyrock.

Tacoma's position since the initiative was first proposed more than two years ago has been that the initiative is unconstitutional because the city has held an FPC license for the two-dam project since 1951 and the U. S. Supreme Court twice has affirmed its right to carry out the development.

Although Mayfield Dam appears beyond reach, Mossyrock may be the subject of legal action. Tacoma won't go to court unless forced. But State Attorney General John J. O'Connell, who declared in the past that the initiative probably is unconstitutional, maintains since the election that it should be tested in court. Tacoma may also have to go to court before it can sell the bonds it will need to finance Mossyrock Dam.

The initiative also could affect a 30,000-kw dam on the Little White Salmon River by the Skamania County PUD and a 15,000-kw project on the Grays River by the Wahkiakum County PUD.

A 20,000-kw project proposed by the Washington Public Power Supply System at Packwood Lake, which eventually drains into the Cowlitz, would not be affected since the lake is beyond "the migration range of anadromous fish," as stipulated in the initiative. A $50-million development of the White Salmon River by the Klickitat County PUD is specifically exemped by terms of the initiative.

Rail terminal and shopping center will merge as part of a . . .

$70-Million Suburban Renewal

"Operation Renaissance," a $70-million renewal program in New Rochelle, a suburb of New York City, will get under way next spring with construction of Westchester Plaza, a $27-million shopping and transit center.

The six-level reinforced concrete structure will enclose nearly 50 acres of floor area under one roof. It will house a railroad station, a bus terminal, parking space for 4,300 automobiles, a large auditorium and 80 retail stores.

A 16-story office tower, probably built of reinforced concrete, will rise out of the base building. It will furnish 200,000 sq ft of office space.

A separate structure housing a two-story bowling alley will feature thin-shell concrete roof construction (lower left of photo).

Demolition and clearance of buildings now occupying the 18-acre site is expected to be completed by spring 1961. Target date for opening: March, 1963.

Westchester Plaza is the first step in a redevelopment program designed to revive New Rochelle's sagging central business district by improving transportation and eliminating slums.

The remaining 48 acres in the 66-acre area scheduled for renewal will contain apartment houses for middle and upper-income groups, a motor hotel, office buildings and recreational facilities.

Public subsidy to cover land acquisition costs for the entire redevelopment project is $9 million. The federal government will contribute $6 million and the city and the state will contribute $1.5 million each.

Westchester Plaza will be the first shopping center in the nation to incorporate a main-line railroad station, a major bus terminal and a huge parking garage as an integral part of the design, according to Sidney Rolfe, president of the developer firm. Located 19 miles northeast of Times Square, the center will border the New England Thruway and the New York, New Haven & Hartford Railroad.

A special ramp will take trucks directly to the loading docks on the roof. Truck deliveries will not interfere with customer traffic and will bypass downtown streets.

The lower levels will house the transportation facilities. The bus terminal will occupy part of the ground level, and the parking garage will occupy the next four levels. Only the third floor will be shared with retail stores. Patrons will travel from one level to another on 12 moving stairs or six elevators.

Major shopping facilities will occupy the fifth level. Open-front stores will flank a 40-ft-wide terrazzo promenade extending the full 1,400-ft length of the building. The 35-ft-high ceiling will admit daylight through skylights. Electric lights will supplement this natural lighting. Air-conditioning will maintain comfortable year-round temperatures. Sculpture, pools, fountains and greenery will decorate the promenade.

Sole developer for the Westchester Plaza project is the Agora Development Corp. Associated with Agora on the remainder of New Rochelle's urban renewal program are Renewal and Development Corp. and HRH Construction Corp. All are from New York City.

Architect is John Graham & Co. of New York City, designers of the huge Lloyd Center in Portland, Ore. (ENR Sept. 3, 1959, p. 40) and Ala Moana Shopping Center in Honolulu (ENR Feb. 25, p. 40).

Consultant for general engineering services is Walter Binger, consulting engineer of New York City. Neither a structural engineer nor a general contractor has been chosen yet.

Apartment Center to Start In Downtown Detroit

Construction of a $14-million residential center with two 22-story apartment towers flanking a two-story garage and an open-court shopping center will begin next spring in Detroit's Lafayette Park section.

Both the apartment towers and the garage structure will be framed in reinforced concrete and walled with aluminum panels. Atop the garage roof will be two pools.

The single-story shopping center will cover a 50,000 sq ft area.

Architect is Ludwig Mies van der Rohe; structural engineer is Nelson, Ostrow, Baskin, Berman & Associates. Both firms are from Chicago. A. J. Etkin Construction Co. of Detroit is the general contractor.

Corps Urges More Flood Spending

- **Twenty-year $11.5-billion program would include 400 new dams and 4,200 miles of floodwalls.**
- **Present $300-million-a-year construction rate would be increased to $500 million by 1970.**

An $11.5-billion, 20-year program of flood-control construction is proposed by the Corps of Engineers in a study report released last week by Sen. Robert S. Kerr (D., Okla.).

Accelerating the current program to the faster pace would reverse the rising curve of U.S. flood losses and reduce estimated 1980 damage well below today's level, the Engineers found.

The Corps made the study at the request of the Senate Select Committee on National Water Resources, of which Senator Kerr is chairman. The committee is now winding up a two-year study of U.S. water resources through 1980.

Increasing the current $300-million-a-year appropriation for flood control exclusive of multiple-purpose projects to $500 million by 1970 and holding it at least that high through 1980 would finance the needed works, the report says.

Without a speed-up, however, losses will continue to edge upward, the study indicates. Increased use of flood plains is inevitable, the Engineers believe, even with more effective controls to limit encroachment and reduce the hazard.

The Engineers estimate that losses for major U.S. flood areas will climb to $960 million a year by 1980 if no additions are made to the flood-control system now in operation. Average annual losses now total about $700 million.

The stepped-up program outlined in the report would cut 1980 flood-plain losses to $483 million, the study shows. This reduction would be attained by investment of $11 billion in dams, levees, flood-walls and channel improvements. An additional $500 million would be expended during the same period to protect coastal areas against hurricane-driven floods.

Over-all, the projected expenditures include $2 billion to complete projects now under construction, $3 billion to build works authorized but not yet started, and $6.5 billion for additional future projects that now appear justifiable.

To date, the Army Engineers have spent $3.8 billion for flood-control construction: $1.35 billion of completed projects, plus nearly $2.5 billion of construction put in place on projects still under way. Today the existing works are saving an average of $500 million a year in flood losses and so far have prevented an estimated total of $9 billion.

Completed or under construction are 219 dams and reservoirs, providing 87 million acre-ft of flood storage, and more than 9,000 miles of levees and floodwalls.

Authorized projects awaiting construction would add 121 dams and reservoirs, with 40 million acre-ft of flood-control capacity, and 3,000 miles of levees and floodwalls.

To these, the projected 20-year program adds proposed projects, now judged practicable, involving 400 reservoirs with 64 million acre-ft of flood storage and 4,200 miles of levees and floodwalls. Other projects not now on the list undoubtedly will prove practicable later.

The report points out that the estimated residual damage of $483 million remaining at completion of the program can be reduced further by construction of upstream soil conservation dams and by state and local action in building projects and applying flood plain zoning controls.

Utilized to even half its full potential flood plain zoning could cut the $483-million damage to about $350 million a year, the report indicates. Complete zoning of flood plains, the Engineers figure, could lower the estimated annual loss to some $220 million.

Small upstream dams would reduce flood damage in upper watershed valleys as well as in the flood plain areas surveyed by the Corps in compiling its estimates.

Army Engineer flood loss estimates apply to all downstream areas and to those portions of the upstream watersheds where the Corps has flood-control responsibilities. On the basis of a Soil Conservation Service estimate of flood damages in minor valleys, the Corps has made an interim approximation of upstream losses that increase the national total by some $300 million. Over-all estimates go up from $700 million to nearly $1 billion today, and they would rise from $960 million to more than $1.3 billion under the assumptions made for 1980.

Senator Kerr said the report shows that the nation can deal effectively with floods. The pace of flood plain development now is raising flood damage potential faster than construction of control works is reducing it. The trend results in part, the report points out, from the economic advantages that outweigh flood risks of riverside and flood plain locations and thus stimulate growth in these areas. However, the same growth also contributes to the total of damages prevented by existing flood-control works.

Physical and economic limitations restrict the construction of flood-control works, the report notes. Essential river valley development may preclude consideration of levees, flood walls or channel improvements in some places. Likewise, reservoir sites previously considered for flood storage are being preempted by development for other purposes. This trend is expected to continue.

Flood-control works, especially reservoirs, generally fit into comprehensive river basin plans, the study confirms. Senator Kerr called attention to the water conservation possibilities of such dams to supply municipal and industrial needs. Other multipurpose benefits include hydropower, low flow regulation in dry weather, irrigation, navigation and recreation.

The flood-control report adds bulk to the large backlog of accelerated public works programs awaiting the attention of Congress in the new Administration. The Senate committee has assembled a score of such documents dealing with multi-billion-dollar developments for the nation's water resources in the next 20 to 40 years. The committee will recommend in January what it thinks should be done.

In addition to the 20-year flood-control program, the latest Corps of Engineers report suggests several other steps:

- Encourage flood plain zoning and preserve important reservoir sites for future use.
- Amend basic legislation to carry out comprehensive river basin programs, particularly making the changes needed to permit basin-wide planning of reservoir systems for regulation of all major rivers.
- Eliminate basic policy differences now existing between federal programs, especially on such essentials as cost sharing and procedures for authorizing projects.
- Coordinate in better fashion all water resources activities in major river basins.

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Mr. Taylor's enthusiasm for the big-capacity and low-maintenance benefits engineered into Cedarapids components is typical of stationary plant operators everywhere. Ask your Cedarapids Dealer for a fact by fact run-down on the complete line of Cedarapids equipment and the field experienced engineering assistance that "tailors" it to your requirements.

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Around the World . . .

• **Lath spec updated**—The 1961 Specifications for Metal Lathing and Furring will provide for the first time for use of portland cement plaster with rib metal lath. Other changes simplify evaluation of fire resistance and installation of steel door frames. Copies of the spec can be obtained from the Metal Lath Manufacturers Association, Engineers Building, Cleveland 14, Ohio.

• **Fifteen-year plan**—North Carolina's State Highway Commission took the first steps in a $35-million, 15-year highway construction program by approving 27 major projects. At least three years of preliminary engineering, location and design work must be done before rights-of-way can be acquired.

• **Phillies stay home**—McCloskey & Co., Philadelphia general contractor, will finance and build an $8-million stadium seating 45,000 in Philadelphia's northeast section, on the Delaware River. A previous proposal would have moved the Philadelphia Phillies across the river to Camden, N. J.

• **Custom cooler**—French authorities are calling a $30-million project near Toulouse "the world's most modern prison." It should be. Plans include a swimming pool, visitors' hotel, theatre, athletic field, gym, TV room and chapel.

• **Private prophet**—The Pennsylvania Turnpike Commission engaged a private weather reporting service to get alerts for snow and ice and detailed forecasts on storms and the times at which they will strike various portions of the turnpike.

• **Bankers building**—Joining the march to New York City's Park Ave., Bankers Trust Co. will build a 30-story building on office row north of Grand Central Station. Though headquarters will stay downtown in the financial district the bank plans initially to occupy 60% of the $18-million building to provide head-office service in the growing midtown area.

• **Highway help**—The International Bank for Reconstruction and Redevelopment has made a $25-million loan to Mexico to help finance the construction or improvement of 13 roads running some 2,000 miles in central and southern Mexico.

• **Energy meeting**—Utilization of solar energy, wind power and geothermal energy—with special attention to problems of less developed countries—will be examined at the United Nations Conference on New Sources of Energy in Rome next August 21-31.

• **New meter reading**—The Eleventh General Conference of Weights and Measures has redefined the standard meter as 1650763.73 wavelengths of orange-red light emitted by the isotope Krypton 86. The new standard replaces a platinum-iridium bar kept in a vault located outside Paris since 1889.

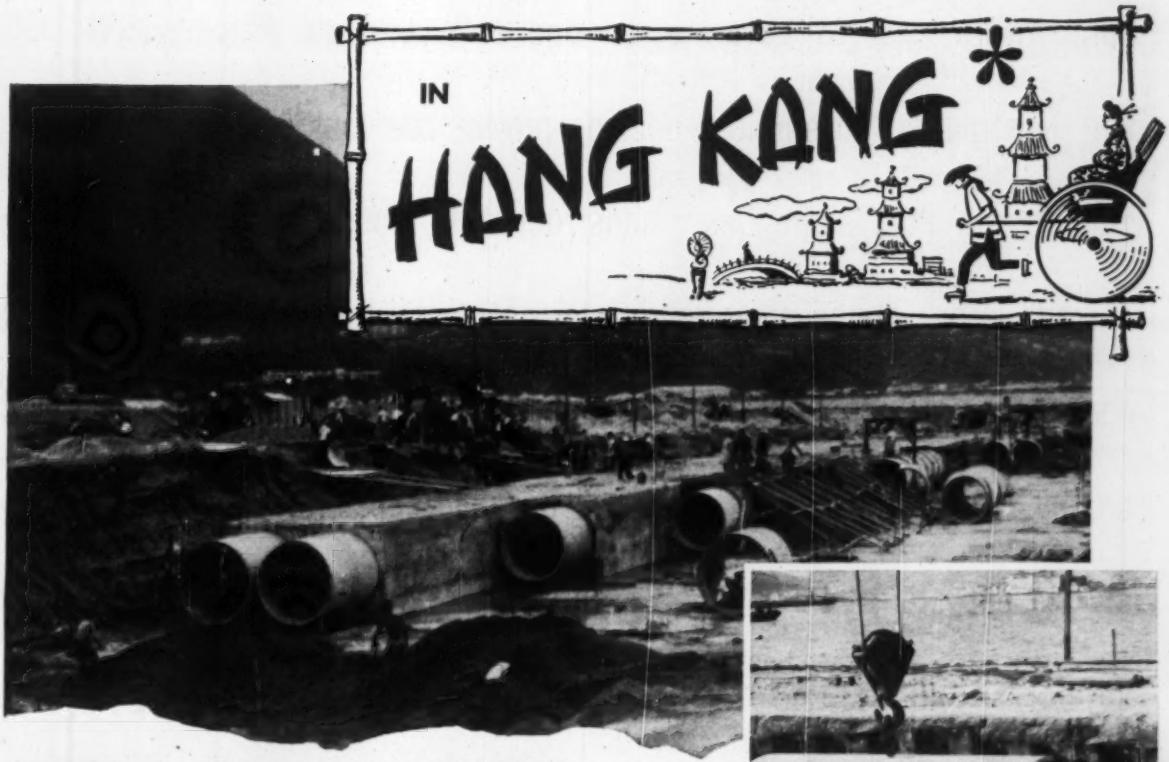
• **More power for West Coast**—Pacific Gas & Electric will spend $500 million for capital expansion of electric and gas facilities over the next 15 months. About $300 million of this is for a 1,400-mile Canadian gas line to be in service next winter.

• **More Northwest passages**—Five major highway improvement and construction projects for Alaska and Northwest Canada were recommended by the Battelle Memorial Institute, Columbus, Ohio. The institute, engaged by the Alaska International Rail and Highway Commission to do a technical-economic study of the area, proposed $240 million worth of road building.

• **Triple threat at Harvard**—Candela-Fuller-Nervi is the program for a series of lectures scheduled by Harvard for the '61-'62 academic year. Felix Candela of Mexico will speak next fall; R. Buckminster Fuller will follow at the beginning of 1962. Pier Luigi Nervi of Italy will lecture in the early spring of 1962.

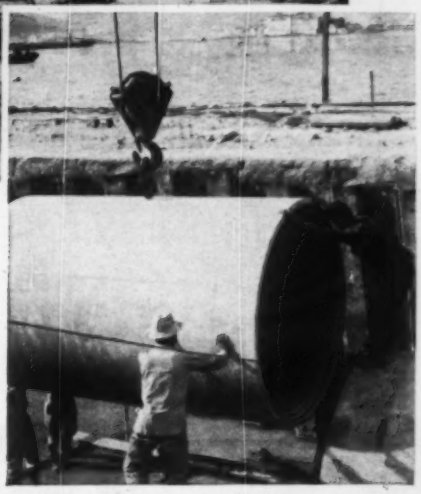
• **Faster in and out**—New York International Airport is preparing for an expected extra increase in next year's peak travel season. It will expand the inspection counters, experiment with motorized luggage buggies and build two telescoping "jetways" for passengers to board or leave planes without going outdoors.

• **Indiana reservoir**—Indiana will pay 54.1% of the construction cost for the Monroe Reservoir, an $11-million multipurpose project on Salt Creek in the south central part of the state. Ruby Construction Co., Lexington, Ky., is constructing associated works for the project.



TYLOX RUBBER GASKETS and REXON PIPE COATING

provide a "long lease on life" for storm-sanitary sewers in Hong Kong Bay



This 72" sewer is being installed along a runway at Kai Tak Airport, which juts straight out into Hong Kong Bay. It must handle not only abrasive storm water run-off, but also the acid-laden sewage and petroleum wastes from business buildings, hangars and repair shops of the development. It must perform without failure of the pipe, or leakage of the joints, and for as far into the future as finest engineering, materials and construction methods can make it.

In specifying acid-resistant, compression-sealing TYLOX Rubber Gaskets for the joints, and abrasion-resistant, non-corroding REXON Coating for *extra* protection of the pipe, engineers not only provided to the utmost for the safety and longevity of the system, but made possible substantial savings in construction costs . . . *Flexible* TYLOX is quickly assembled to pipe, and permits fast assembly of the line. It compensates for pipe angularities, permits wet trench jointing and immediate backfilling. Used together, TYLOX Gaskets and REXON Pipe Coating make pipe lines leakproof and acid-resistant *throughout*.

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***PROJECT:** KAI TAK Airport Development, Government of Hong Kong.

ENGINEERS: Scott & Wilson Kirkpatrick & Partners, London, S. W. 1.

CONTRACTORS: Gammon (Malaya) Ltd., Kowloon, Hong Kong.

PIPE: 18" to 72" reinforced concrete, manufactured by Gamco Pipes Ltd., a subsidiary of Gammon (Malaya) Ltd.

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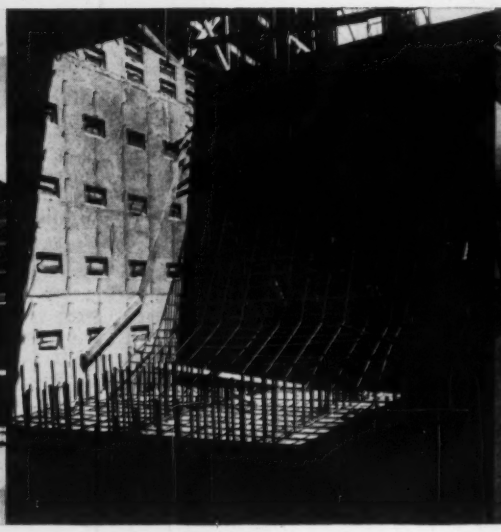
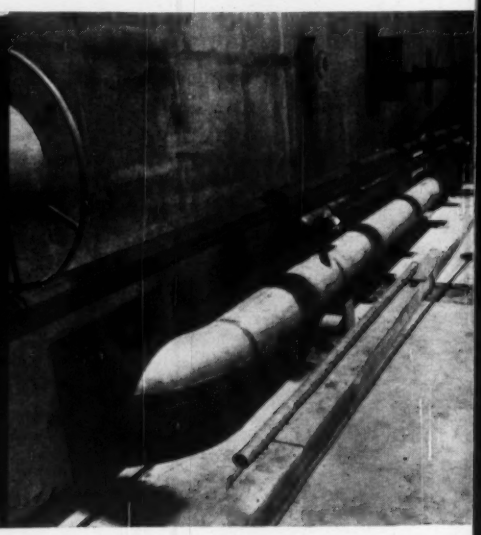
Somewhere east of Laramie, on one of Wyoming's plains, you'll find the strangest government housing project ever built. Six concrete and steel buildings are being constructed to house Atlas missiles. The site is one of the operational intercontinental missile bases to be operated by the Strategic Air Command. This base is being constructed on the surface. Follow-on bases will burrow deep into the earth. In all these systems, the Air Force puts much emphasis into ground support equipment. Virtually all steels required can be purchased from one firm — United States Steel. Whether it's carbon

The U. S. Army Corps of Engineers is constructing this operational intercontinental missile base in Wyoming. In front of the partially completed Launch and Service Buildings are Col. Sidney T. Martin, in charge of construction, and Maurice K. Graber, a construction engineer for the Corps.



This is the inside of the blast pit of one of the launcher buildings. In all six of these buildings there are 1,040 tons of structural steel, 1,950 tons of reinforcing steel, over 48,000 tons of concrete aggregate, blocks and cement, and 8,040 tons of mechanical steel items.



Fuel lines and process piping are Stainless Steel and operate at pressures up to 15,000 psi. The pipes are kept almost surgically clean to prevent contamination of fuel and subsequent malfunction. Vapor degreasing and chemical cleaning processes are used on the pipes.

steel, high-strength low-alloy steel, ultra high-strength alloy steels, Stainless Steel, steel fence, electrical cable, cement or wire rope, United States Steel maintains the technical services to assist in solving any problem on materials for ground support. When a ground support program goes to the drawing board, consult with

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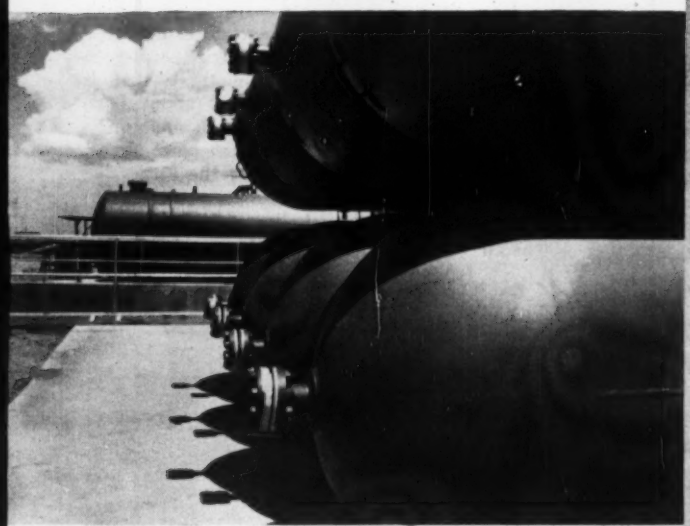
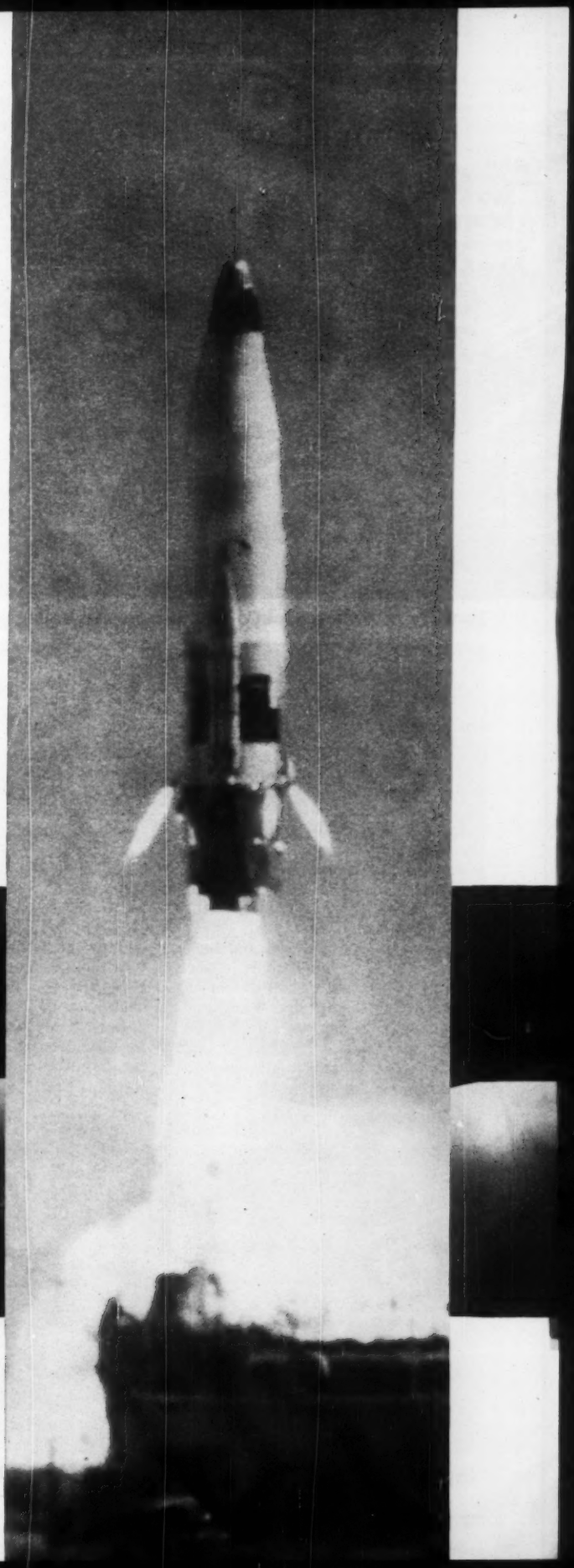


The Atlas is powered by a cluster of liquid propellant rocket engines that burn liquid oxygen and RP-1, a kerosene-like hydrocarbon fuel. 192 pressure tanks fabricated from alloy or Stainless Steel plate at this site store liquid and gases—liquid oxygen and nitrogen and helium gases which are used to inject the fuels into the missiles.



Space a problem, Tokyo highway tops buildings in old canal.

Reclaiming land makes room for

Japan's Great Growth Is Paced by

By Waldo G. Bowman, Editor

The traveler in Japan today seldom finds himself out of sight of a construction job.

Japan is celebrating the 100th anniversary year of its opening to Western commerce and influence with a construction boom—a boom that could be envied in any country seeking a rising standard of living.

But impatient to do more and better, the ambitious and industrious Japanese look at their construction boom dispassionately and critically. They see it as not only failing to meet current needs, but, more important, as limiting the speed of industrial growth.

Foreigners are prone to think of Japan as having the highest living standards in Asia. It does, but the Japanese look at the problem differently. They see themselves as having the lowest living standards among the world's industrialized nations.

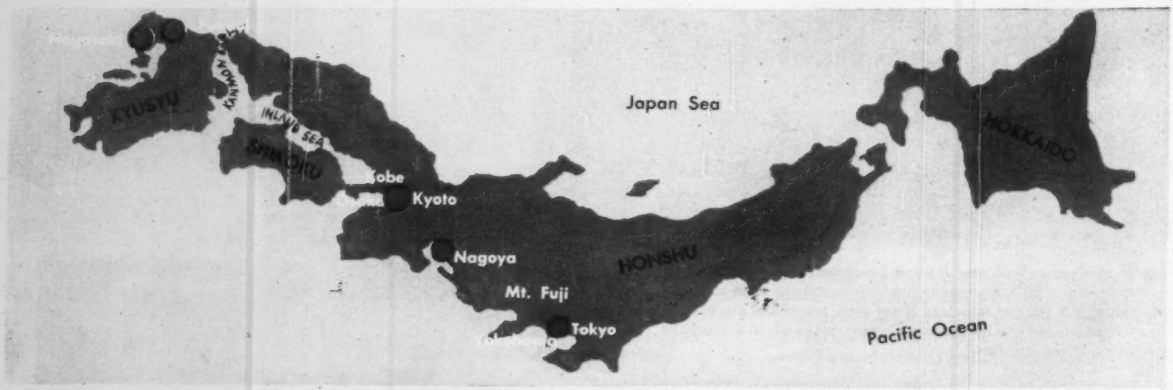
Extensive as Japan's construction boom is, it falls short in the fields of highways, housing, water supply, sanitation and the creation of new land by dredging.

Only in the field of power supply is construction progress satisfactory, and even here the pressure for new facilities shows no sign of slackening.

But if Japan's construction boom has shortcomings, if construction paces the country's growth too slowly to suit the Japanese, it is nevertheless a boom with some notable characteristics. The evidence of construction is naturally most marked in and around the cities, yet some of the most extensive and frenzied activity can be found far off the beaten path. In the mountain vastness of the Japanese Alps, for example, dams are being built in greater numbers than any place else in the world.

Regardless of where construction is located, it is being carried out with modern mechanized methods—that is the truly significant fact about Japanese construction, for such modernization of practice has taken place almost wholly in the decade of the Fifties.

It cannot be said, of course, that Japan was wholly lacking in notable construction achievements before



Japan—an area smaller than California—has 90 million people largely concentrated in five areas.

growth, as here in Tokyo Bay.

Buildings go higher. Asahi Building in Osaka is tallest, 148 ft.

Construction

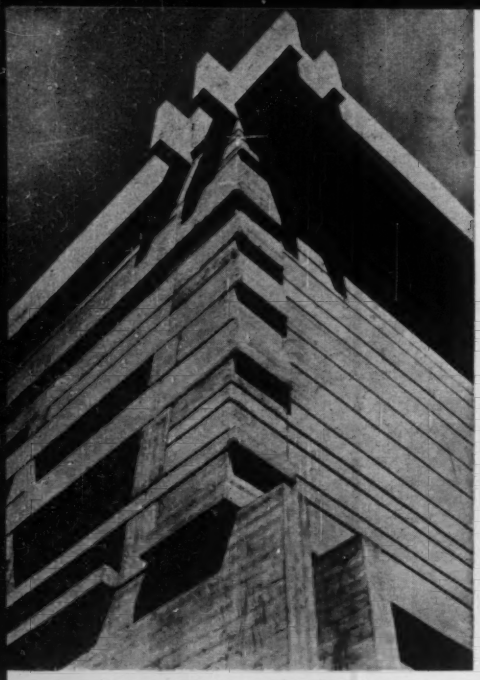
World War II. Railway tunnels up to six miles long, including one under the strait between Honshu and Kyushu islands, were completed in the 1930's. The first line of the Tokyo subway system was another difficult job successfully completed in the prewar era even earlier. After the 1923 earthquake, notable advances were made in anti-seismic foundation and superstructure designs of buildings. And large, complicated port and harbor works were also carried out.

But nearly all these earlier works were a long time in building because traditional hand-labor practices were followed. Now all that is changed; speed through mechanization is the object everywhere.

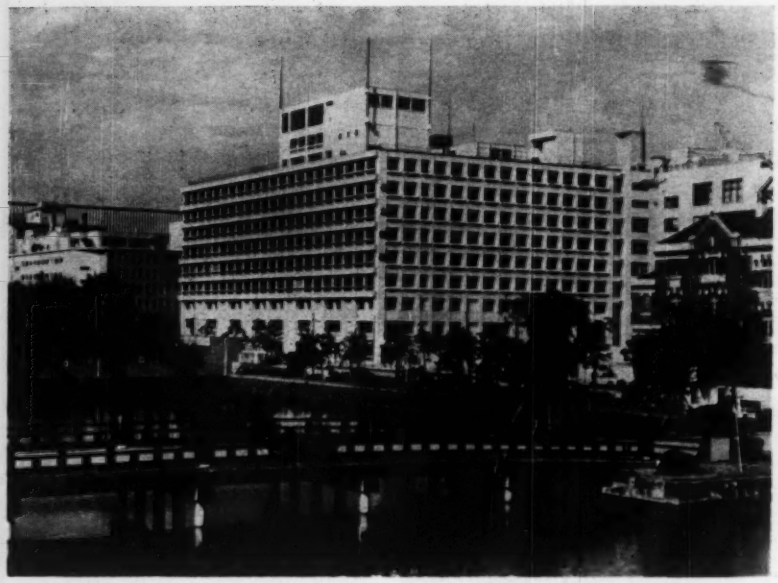
Such a sudden transformation probably could not occur in any other country. The reason for Japan's success is its willingness to copy what has proved successful elsewhere, and its ability to utilize imported methods or machines with remarkable effectiveness. If sometimes a too literal adaptation has brought troubles, these have been overcome by perseverence. Moreover, and with increasing frequency, alterations have been made in the imported methods or machines that have raised their effectiveness above their original state.

The Japanese willingness to pick the best that the world has to offer, and to use and improve it, is aided by the attitude of the Japanese workmen. They seem as anxious to advance the tech-

Roadbuilding helps pace growth; mountains add to space problem.



New Japanese architecture . . .



typified by Tokyo building facing Imperial Palace moat . . .

nique and speed of construction as their employers. Industrious, cheerful, agile and daring, the Japanese worker is contributing as much to his country's success in mastering modern construction techniques as are the methods and the machines.

As new techniques begin to pay off in more economical construction, the Japanese workman will deserve to be better compensated than he is today. The rate for common labor is now about 40 cents an hour; skilled rates range upward to $1.00.

Although Japan's economy is geared to exporting products in which a low labor cost assures a telling competitive advantage, some employers recognize that placing purchasing power in the hands of the workers is also necessary, both economically and socially. The Japanese construction worker is already beginning to benefit from better job conditions—more comfortable jobsite housing, improved medical care and more safety precautions. These last are badly needed—the fatality rate on dam construction, for example, is 10 to 25 times higher than in the U.S.). Better pay is coming to be regarded as the next logical step.

Japan's drive for industrial growth and its concentration on construction as the ingredient necessary to support this growth—and to supply the facilities for the kind of living standards that an industrial nation can boast of—seems certain to survive any political difficulties the country may experience in adjusting to its postwar democratic way of life. For the present, in any event, it is continuing to experience a growth and prosperity unequalled in its history—an 8% annual increase in its gross national product over the past decade.

While this growth is largely a result of its hard working people, it has a powerful assist from the United States, which has relieved the country of the huge expenses of a military establishment, loaned it large sums of money and provided a market for its manufactured products. These assets are not likely to be thrown overboard readily or willingly.

They are assets that help to support the current construction boom, which, regardless of its shortcomings, is beginning to raise Japan to its desired prominence among the world's industrial nations. How much farther construction activity must carry the country to attain this goal, and under what difficulties, becomes clearer when the areas of needed construction are examined separately.

Space to Expand

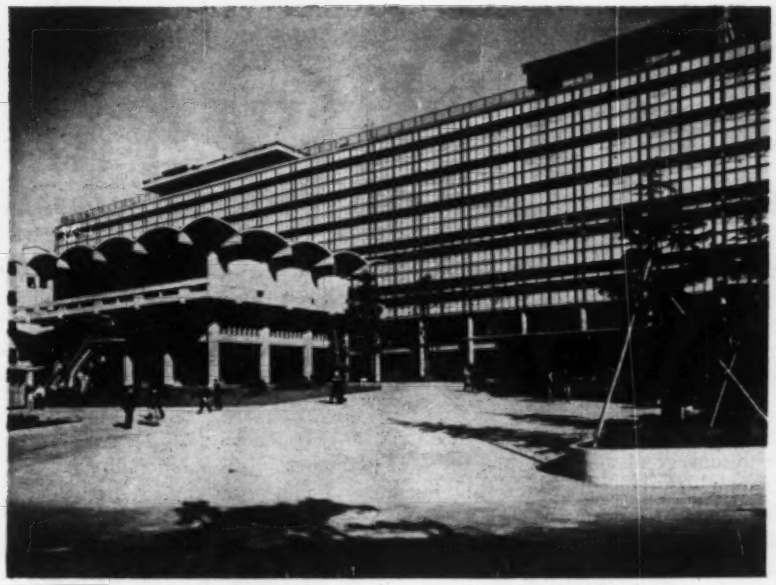
More than anything else, a shortage of space in which to live and work explains Japanese life—its social and psychological aspects as well as its purely physical structure. Japan supports more than 90 million people on only 142,773,000 square miles (less than California). Barely 20% of this area is arable.

Thus every square inch of usable land becomes valuable. Reflecting this fact, the standard of measurement in Japan is the tsubo—an area of 6x6 ft—not the acre or the hectare. (For housing and other construction, the unit is the bo, which is 6x3 ft, or the size of the tatami mats of straw and reeds which cover Japanese floors. Since these mats have been used from time immemorial, modular construction, with a module of 3 ft, would seem to have been practiced in Japan several centuries before the term was invented in the U. S.)

The land space problem is further aggravated by the fact that Japan's population is concentrating more and more in four principal metropolitan areas: Tokyo-Yokohama, Osaka-Kobe-Kyoto, the Nagoya area on Honshu Island and the industrial belt area at the north end of Kyushu Island. Moreover, Japan's population, while slackening off by Asian standards, is still increasing at about one-million annually. Industrialization, Japan's important distinction from all other lands of Asia, makes it possible to feed this growing population and to lift its standards of living.

Food is not the problem, just land. The Ministry of Construction estimates that more than 400,000 acres of "new" land will be needed in the next decade for industry, housing and public utilities. It will cost an estimated $50 billion to create the new land, since most of it must be dredged up along Japan's seacoasts or carved out of her mountains.

Making land by dredging is not new to Japan; a large part of downtown Tokyo was once a part of the bay. But the need for such land is more pressing today. About 3,000 acres are being created annually, and the plan is to step this up to 4,000. Fisheries, rice farming and industries seeking to get leaseholds at the edge of the water (because almost all Japanese raw materials are imported) are locked in competition over every tsubo.



often adapts temple shapes to concrete as at Hosei University.

From a construction point of view, the reclamation is simple. A steel sheetpile or concrete wall is built around the area and one or more suction dredges go to work. The fill is sandy, and it drains easily through holes in the walls or through strategically located sluices.

The government recoups the cost of the operation, and often a good-sized profit, when it sells the land to the type of buyer that the Ministry of International Trade and Industry designates, which may be a steel company, a refinery or a machinery manufacturer. The government can thus exercize a powerful control in the field of regional planning.

Some 16,000 more acres is the target for dredging from Tokyo Bay, although there is one grandiose plan by a group of Tokyo architects and builders to fill the entire bay and create a new city. No one gives this idea much hope.

The most spectacular of the present reclamation projects for industrial sites is in Ise Bay, south of Nagoya. Nagoya is rapidly developing into Japan's heavy industrial center and promises soon to outdistance both Tokyo and Osaka in a number of respects. The city took advantage of war devastation to plan and lay out wide streets and otherwise to control its growth. Dense development will be allowed only in the area extending five miles from the center of the city. The next two mile ring is reserved for suburbs with a three-mile greenbelt around it. A 15-mile area outside this greenbelt is reserved for satellite cities.

Nagoya's reclamation project, begun in 1959, is scheduled for completion in 1965. It involves 4,000 acres and will cost $60 million. About 1,000 acres is now in place. It will be partly occupied by the Tokai Iron and Steel Co.

At Sakai, a port south of Osaka, an 1,800-acre $40-million project is under way. Yawata Steel, Japan's largest steel producer, will locate a plant there.

In Tokyo Bay some 70% of a 1,600-acre $35-million project is completed under the ownership of the Tokyo Metropolitan Government.

And farther south on the bay, the cities of Yokohama and Kawasaki are bringing projects of 800 and 1,600 acres to completion.

Meanwhile the Ministry of Agriculture & Forestry is carrying forward a program to reclaim farmland. Work is under way on 97,000 acres; and some 93,000 acres have already been reclaimed. One of the projects involves the filling of a large lake at the north end of Honshu Island, where the Ministry plans to establish dairy farming rather than devote the area to rice, as has been past practice.

Housing, Utilities Needs

The prime focus on industry and farming, as exemplified by the reclamation projects, has caused Japan to neglect its housing and its sanitary facilities. Some 2.3 million houses were destroyed in the war. While most of these have been replaced, neither their design nor locations have been much improved. Nor has additional housing kept pace with population growth. Thus housing is probably the only measure of the Japanese standard of living that is not yet up to prewar levels.

Ninety percent of the urban buildings in Japan are still of wood. Recognizing the dangerous fire hazard involved and the fact that such buildings (seldom more than two stories high) do not utilize land efficiently, the government is offering a subsidy for the construction of fireproof buildings placed along the main streets of 90 of the country's cities. Such a row of buildings is visualized as a screen to prevent the spread of fires. Being four or more stories high, they also utilize the land more efficiently.

The principal government housing activity is carried out by the Japan Housing Corp., which was organized in 1955 to construct apartment houses and satellite communities. It has built about 30,000 housing units a year and has started development of housing sites totaling 2,775 hectares.

Water supply, like housing, has not kept pace with the population growth, although a herculean effort has been made to improve it. The number of cities with municipal waterworks has been doubled in the past decade, yet only about 49% of the urban population has access to a city supply. Even in Tokyo, large areas are without water for long periods in the summer. This despite completion in 1957 of a huge new storage reservoir behind Ogochi Dam, a 490-ft-high gravity structure containing 2.2 million cu yd of concrete and believed to be the largest dam ever built exclusively for water supply.

Sewage facilities are even more inadequate. Less than 15% of the built-up area of the country is served by a sewerage system. There are treatment plants in 45 cities, but a recent government report notes that only 14 of these are in operation. The government plans to provide sewerage for 23.5% of the total urban area by 1962, but meanwhile large areas of Tokyo and other major cities must be served by trucks, which haul the sewage to the ocean where it often pollutes the shoreline. Sanitation is one of Japan's truly big problems.

Roadbuilding Chore Ahead

Japan's highways are as inadequate for their purpose as any in the world. Built for oxcarts, they must now serve a modern industrial economy to which the motor car and the motor truck are essential adjuncts. Until the end of the war, there were never more than 200,000 motor vehicles in service. Today there are 2 million four-wheeled vehicles and some 1.3 million smaller two- and three-wheel conveyances. Automobile production this year will probably exceed 400,000.

Prewar Japan relied on railways for its transportation, so there was virtually

(*Continued* on p. 38)

Field Performance Report

Users confirm that DOUBLE GRAY-X® Wire Rope lasts longer on tough jobs

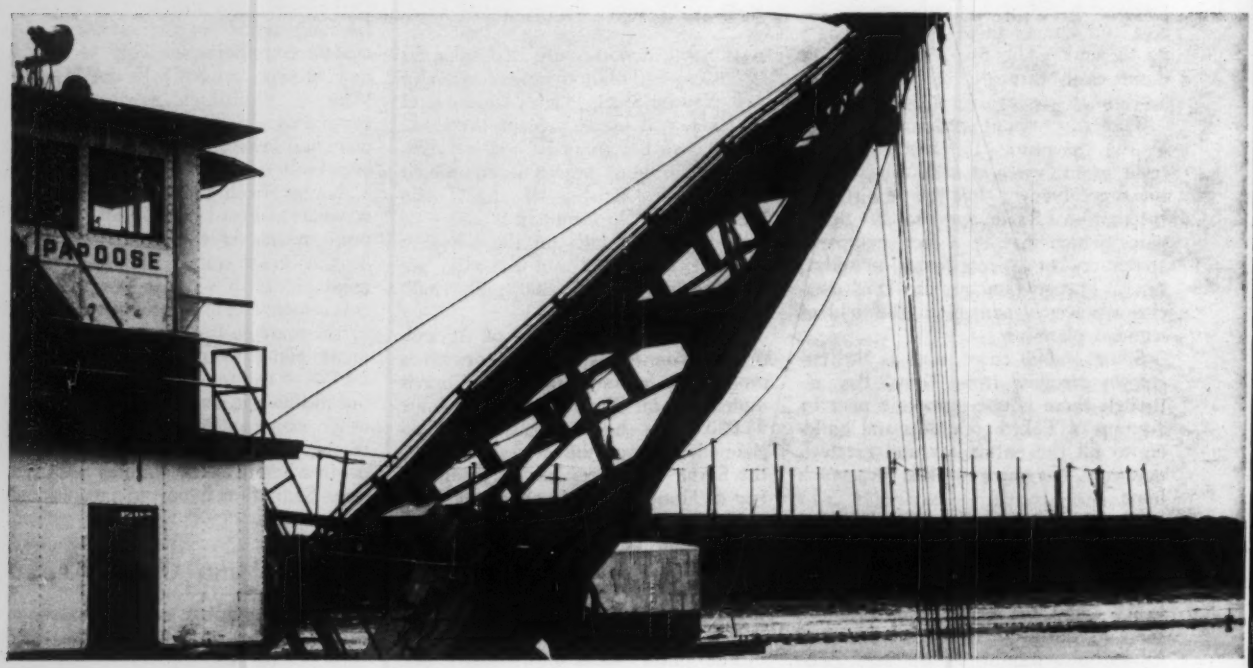
Field reports are now coming through on CF&I-Wickwire's superior new wire rope—Double Gray-X. These reports, a few of which are summarized here, all agree on one point — when the going really gets tough, Double Gray-X lasts longer than other wire ropes.

Double Gray-X is the result of CF&I's intensive research program leading to the discovery of a remarkable new wire-drawing technique. This process includes the use of Molysulfide* in the lubricant, which creates a *permanent molecular shield* around the individual wires, resulting in these benefits:

- **reduced friction between individual wires in every strand of Double Gray-X during service;**
- **smoother wire surface, which helps eliminate the "weak links" that can cause breakage and impair service life;**
- **greater resistance to abrasion, crushing, bending.**

And—in addition to longer life—Double Gray-X gives you extra strength. Made of extra-improved plow steel with an independent wire rope core, this rope gives 15% higher breaking strength than the catalog breaking strength of an improved plow steel rope with IWRC.

Double Gray-X is made in a wide range of sizes and constructions. It's available from CF&I-Wickwire's chain of warehouses and nation-wide network of distributors. For complete details, call the nearest CF&I sales office or a Wickwire Rope distributor.



REPORT: ON THE SACRAMENTO RIVER, two dredges – the *Papoose* and the *San Diego*—are sucking up tons of silt to help make Sacramento a seaport. Both use Double Gray-X for lines on swings, spuds and ladders.

Captain Nick Carlson of the *Papoose* (Hydraulic Dredge Company) says: "The Double Gray-X rope that holds the suction head really takes a beating on both spud and swing lines, but it's still in fine shape. However, another brand of wire rope put in at the same time is beginning to show wear."

Captain Ralph Vea of the *San Diego* (Pacific Dredging Company) reports: "When you're down with rope failure in this business, you're really out of production. But Wickwire Rope, which we have been using for nineteen months, really keeps us going. We used to change swing lines every six weeks, but the Double Gray-X we have on there now has been in service nine weeks already. That new protective shield on the rope really does the job."

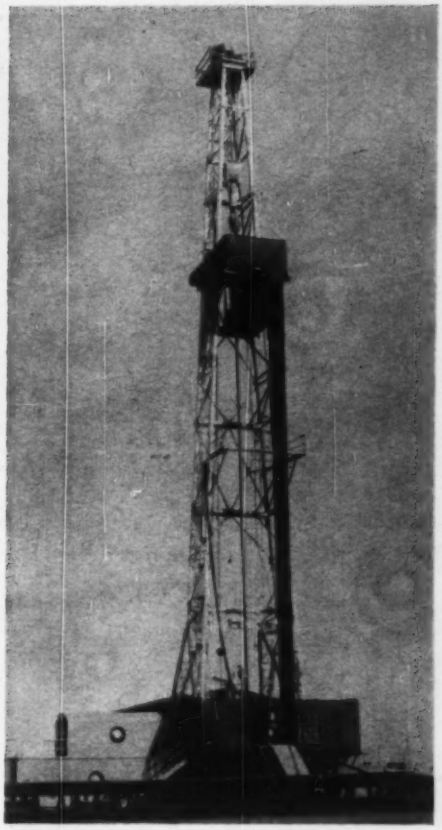
*Registered Trademark of Climax Molybdenum Co.

REPORT:

IN THE MOUNTAINS OF COLORADO, the Hopkins Construction Company relied heavily on Double Gray-X on "two of the toughest construction jobs we ever handled." Both required the moving of more than 300,000 cubic yards of material. Many different types of earth-moving equipment, including the power shovel pictured above, were equipped with Double Gray-X — with these results:

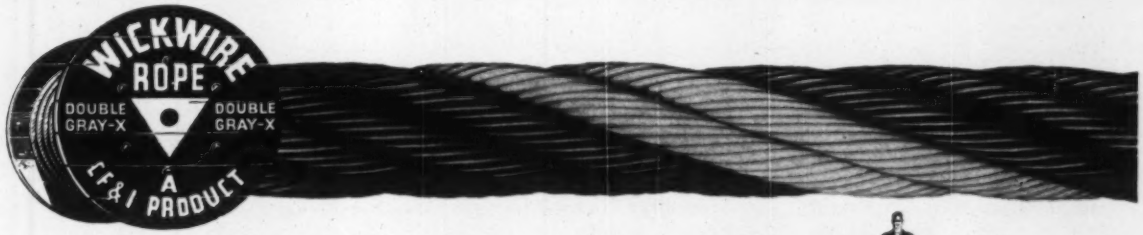
President Hopkins: "Every minute of working time counted on the Cheyenne Mountain job because we faced a $5,000-a-day penalty if we didn't finish it in 45 days. The service we got from Double Gray-X was wonderful. We didn't lose 1% of downtime because of rope failure — and we completed the job in exactly 45 days."

Duane Rundle, Project Superintendent on the South St. Vrain Canyon job: "Rope life has been improved and downtime cut drastically since we switched to Double Gray-X. Maintenance is no problem at all. We just grease the rope when needed."



REPORT:

ON ROTARY OIL RIGS of the Falcon Seaboard Drilling Company, a prototype of Double Gray-X underwent tests that put wire rope to the most extreme abuse. Mr. Jack Starr, Vice President in Charge of Drilling, comments: "The results obtained with the original prototype of Double Gray-X led to our decision to order a carload of this improved product. Falcon Seaboard insists on the best products to serve the oil industry in accordance with today's modern standards."



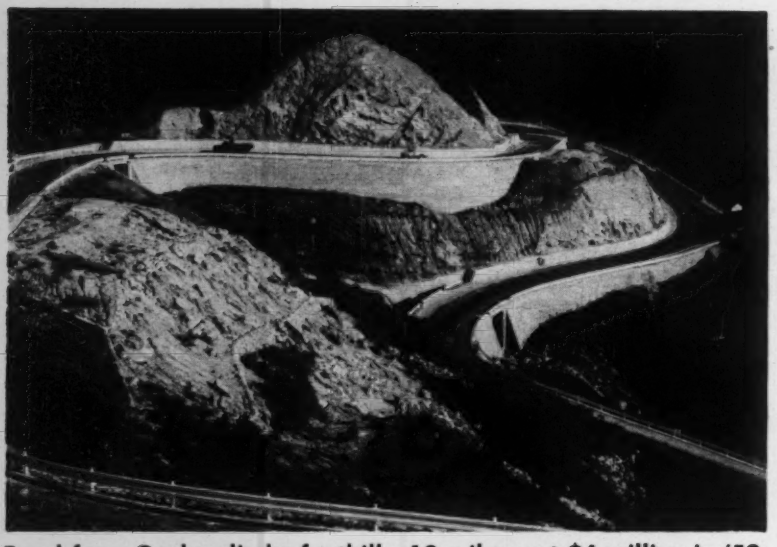
WICKWIRE ROPE

THE COLORADO FUEL AND IRON CORPORATION

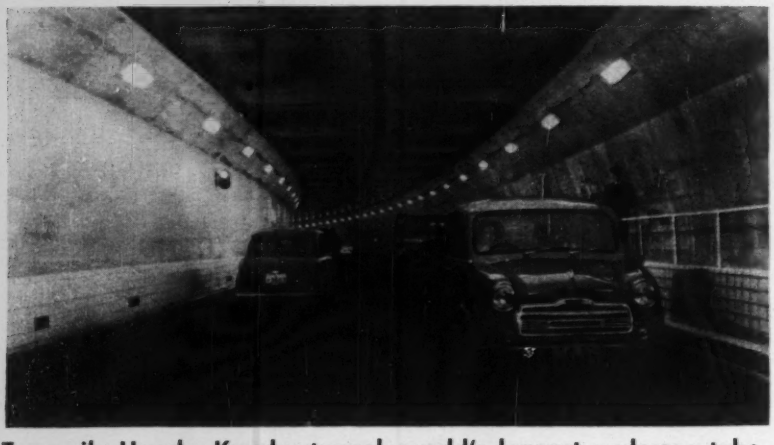
CF&I STEEL

In the West: **THE COLORADO FUEL AND IRON CORPORATION** — Albuquerque • Amarillo • Billings • Boise • Butte Denver • El Paso • Farmington (N. M.) • Ft. Worth • Houston • Kansas City • Lincoln • Los Angeles • Oakland Odessa (Tex.) • Oklahoma City • Phoenix • Portland • Pueblo • Salt Lake City • San Francisco • San Leandro Seattle • Spokane • Tulsa • Wichita

In the East: **WICKWIRE SPENCER STEEL DIVISION** — Boston • Buffalo • Chattanooga • Chicago • Detroit Emlenton (Pa.) • New Orleans • New York • Philadelphia



Road from Osaka climbs foothills; 10 miles cost $4 million in '59.



Two-mile Honshu-Kyushu tunnel; world's longest undersea tube.

no highway system as such. And up until about four years ago there was no visible concern that one should be developed. By that time the motor age had arrived, and the few paved two-lane arteries available were choked with traffic. Statistics show the situation in bold relief while the over-all freight index increased at an average annual rate of 5.6% from 1950 to 1958, the freight carried by highway vehicles increased at an annual rate of 16%.

Private companies had operated a few toll roads before and after the war. This apparently influenced the public authorities to finance their road construction with tolls. At first, capital was obtained only from loans granted by the national government, but in 1956 the Japan Highway Public Corp. was formed and granted the right to issue bonds as well as to borrow from the government. It took over from the local authorities all of the toll roads then under construction and in operation, and since has had jurisdiction over all expressway development, with one exception. This exception relates to the expressways needed in Tokyo, which in 1959 were placed in charge of the Tokyo Expressway Corp., specifically formed to devote exclusive attention to the critical problem of congestion in that city.

Recently the Ikeda government has revised the former five-year road-building program upward in the hope that more roads can be built more rapidly. The government estimates that there will be 3.1 million motor vehicles by 1965 and almost 6 million by 1970. It plans to invest about $6.5 billion in highways in the next five years. The main target consists of the expressways linking the metropolitan areas and those within the areas themselves. Not much hope is held out for improvements on the thousands of miles of other roads. Their gravel surfaces, if any, must still be maintained by farmers working them with hand shovels and rakes. Even main secondary roads, which have bridges facing blind curves, frequent changes in width and unimproved stretches between lengths of new pavement, will have to wait rebuilding until some relief is provided on the primary system.

Fortunately, the situation is not so dismal when the primary system is looked at as a whole. There are several new express highways—short in U. S. terms, but well built and important because of their strategic location. One of these is the seven-mile Manazuru Highway, which skirts the shore of Sagami Bay in the vicinity of Mt. Fuji. It is carved out of steep cliffs and involves several tunnels and long lengths of seawall. Between Osaka and Nara, the 10-mile Hanna Highway traverses the ricefields of one of the most ancient areas of Japan and winds up and over some rather high foothills. However, it is only 20 ft wide. Closer to expressway standards is the 40-ft-wide Yokohama Bypass, which, in eight miles, detours Tokyo-bound traffic around the port of Yokohama.

Japan's true expressway will be the 112-mile line connecting Nagoya and Kobe. A four-lane divided highway, it will cost about $220 million of which $40 million has been obtained by a loan from the World Bank. About 30 miles of this Nagoya-Kobe expressway has been completed; the entire project is scheduled to be finished in 1962.

There are several notable structures on these new highways. The Wakato Bridge, now under construction on the island of Kyushu near Fukuoaka, is a wire cable suspension structure with a main span of 1,207 ft. The Saikai Bridge on Kyushu, near Nagasaki, is a fixed steel arch of 711-ft span. Both of these structures are the longest of their type in the Far East—the Kyushu bridge is among the longest arches in the world. There are several long tunnels of about 1¼ mile length, and one notable tunnel extending for over 2 miles under Kanmon Strait, which separates Honshu and Kyushu islands.

Kanmon Tunnel was started in 1939, but it was not completed until 1958. About 38 ft in diameter, it accommodates a 25-ft roadway for vehicles and below this a 13 ft-wide-passageway for pedestrians and bicycles. At its deepest point the roadway is 184 ft below mean water level. Four ventilating shafts are used, each equipped with three fresh air fans and three exhaust fans. Fresh air ducts in the tunnel are below the roadway along either side of the pedestrian passage.

In the field of tunnel construction, too, Japan National Railways is building the notable New Tanna Tunnel in the Mt. Fuji area. It will be 4.9

miles long and accommodate the new standard gage line (the first in Japan), which will connect Tokyo and Osaka. About half the length of the tunnel has been driven, and it is planned to be complete in 1963 when the rest of the line should be ready to go into operation. Trains will run at 100 miles per hour, cutting the present running time between the two cities from 6½ hours to three hours. A World Bank loan to help finance this major transportation facility is presently being negotiated.

Tokyo, a Special Problem

Tokyo, the world's largest city, probably suffers from more urban development problems than any metropolis in the world. It has a population of over nine million, a limited area in which to accommodate it and a growth rate of about 200,000 a year.

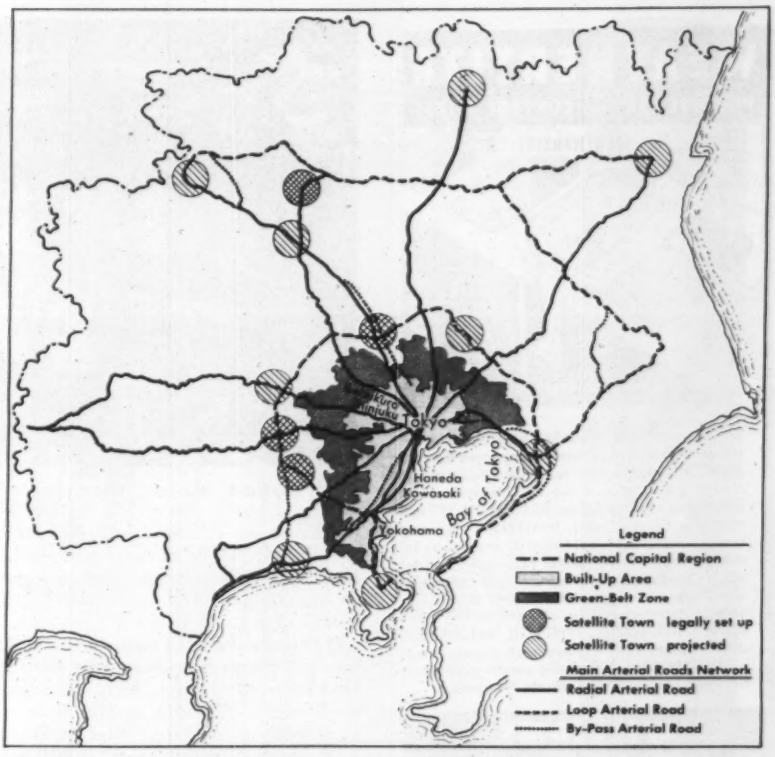
In 1956, faced with the appalling prospect of what the city would be like in the future, the Diet passed the Metropolitan Reconstruction Law. The law established the Capital Area Reconstruction Committee, which reports directly to the Prime Minister. The Committee coordinates plans of the national government, metropolitan Tokyo and the seven surrounding prefectures. This body is setting out to reconstruct the whole Tokyo area within a radius of about 35 miles from the center of the city. The target date for the program is 1975.

As shown on the map the plan divides the whole area into three elements —the present built-up area, which includes Tokyo, Yokohama and several other cities; a green belt; and a series of satellite towns beyond. This is the same plan being followed in Nagoya, but there it was instituted before war reconstruction took place. In Tokyo the problem will be more difficult.

The program lays emphasis on halting the concentration in downtown Tokyo. Legislation has already been enacted which prohibits the building of any new factories or universities in the interior area. Four industrial estates are already under construction in the outer area, which will serve as the nucleus of satellite cities. And by 1975 the planners project 30 such satellites with a total population of 2.7 million.

The plan will cost an estimated $33 billion.

Traffic and transportation improvement is a major objective. Tokyo's present 21-mile subway network will be boosted to 65 miles. Two new semi-government corporations have been formed to build subways and highways. A system of eight different subway routes and 10 major expressways into the center of the city from beyond the green belt is proposed. One of the most important of these will be a non-stop expressway leading from Haneda International Airport into the heart of the built-up area.



Green belt, satellite towns are in the plan for Tokyo's growth.

In their effort to halt the march toward the center of the city, the planners hope to turn a number of local neighborhood centers into sub-central areas. These already exist in an embryonic form as the terminals of several private railways where the station building includes department stores, theaters, restaurants, etc.

The first of these sub-central areas is already under way in Shinjuku (see map), about 15 minutes from downtown Tokyo by express train. One of the city's water reservoirs has been moved from there into the green belt area, and its land is being turned into an office building development. The work will be completed next year. Meanwhile, land is being secured in Ikebukuro, another nearby area, for a similar development.

Also high on the list of priorities is an overhaul and expansion of the Tokyo sewerage and water system.

Is there a difference between these plans and what is likely to happen in Tokyo? Pessimists note that the government so far has failed to take a really tough stand to enforce the plan, but optimists count on the growing chaos in the city as virtually forcing the plan to be carried out.

At least one of the plan's objectives —to raise the average height of buildings in the built-up area from 1.6 stories to 3.2 stories—would seem to be being approached automatically. One can look in any direction over Tokyo and see new office and hotel buildings of 8, 9 or 10 stories going up.

A corollary of Tokyo's boom in modern buildings is the almost unconscious development of a new Japanese style in architecture. The style includes thick floor slabs, cantilevered beyond the columns to provide rain protection and also a sunshade, since the new buildings trend to extensive use of glass in the walls. Most are of reinforced concrete in response to a feeling that both fireproofness and earthquake resistance are a maximum in this type of construction. But many buildings now under way have steel frames.

This new style is by no means confined to tall buildings, however. In the smaller structures, very slender columns are used and the glass walls are designed as sliding doors suggestive of the sliding paper walls of the traditional Japanese house.

The thick slabs in the larger buildings give the structures a massive appearance, distinct from earlier Japanese architecture, but the overhangs and the balconies emphasize horizontal lines, which are traditional. And whether they are beautiful architecture or not, the

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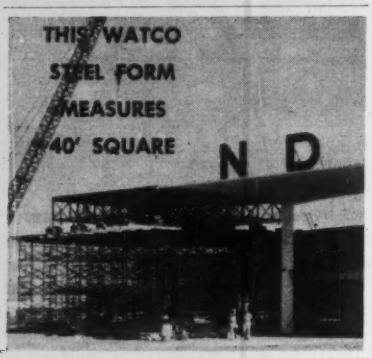

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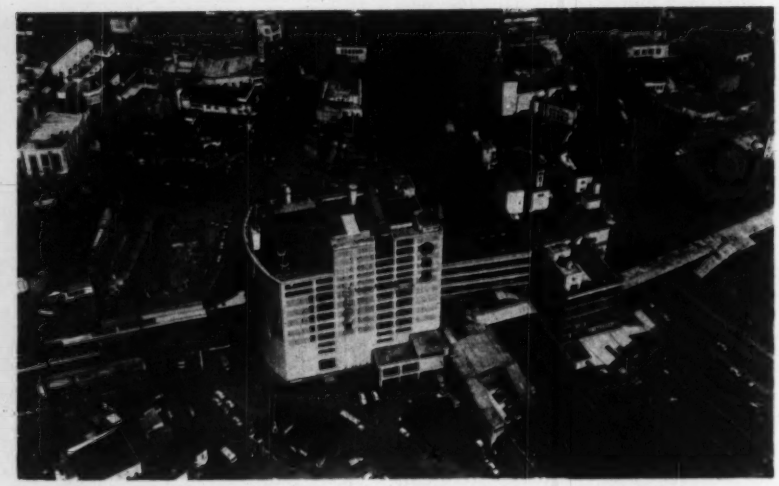

Rail station, stores, theaters are core of satellite redevelopment.

overhangs are defended as highly functional, not only as sun and rain shades, but as protection against shattered glass in an earthquake and as obstacles to the spread of fire.

The massiveness of some of the buildings is perhaps accentuated by the fact that none of them is high. Buildings in Tokyo are limited to 104 ft as an earthquake precaution. Most architects now believe that this height limit could be raised, at least to 160 ft and perhaps to 200. (The tallest building in Japan, the New Asahi Building in Osaka, rises to a height of 148 ft.)

When considering taller buildings in Japan, however, foundation conditions must also be taken into account. No solid subsoil exists in any of the large cities. Floating slabs and concrete piles are most widely used, but wall and column caissons have also been utilized. On several buildings the entire basement has been formed as a caisson, built on top of the ground and sunk as the weight of the superstructure is added. The walls are the cutting edges, and excavation within the caisson is carefully controlled to keep sinking uniform and level. All of these methods have proved effective, and Japanese engineers feel that all of them, and particularly piles, can be used to greater capacity based on the extensive work done at the Construction Ministry's Building Research Institute, where many of the world's most notable earthquake studies have been carried out.

Future: Difficult but Bright

In total, the construction boom in Japan is about as the Japanese themselves see it—big but far from adequate. In terms of bigness, construction this year will total $600 million—nearly 16% of the gross national product. Last year the percentage of GNP was 11.5, about the same as in the U.S. Construction in 1959 was 29% over 1958. This year there will be a 17% gain over 1959.

With contracts being let at the rate of a half million dollars a day, construction can be described in no other terms than booming.

But as most of this article has shown, the need for more of the facilities that construction can provide far outweighs any importance that can be attached to the boom. The fact that this is the viewpoint of the Japanese themselves is significant, for it has sparked the planning of continuous redevelopment programs adequate to bring the Japanese standard of living into consonance with its remarkably high level of industrial efficiency.

In most countries such grandiose planning in the face of inadequate capital would be properly classified as dreaming.

In Japan, with its already developed industry and its hardworking people, such a conclusion would be foolhardy. In view of what Japan has accomplished in the decade since it began to scrape away the ashes of war devastation, a better appraisal of Japan's future is that it will be difficult, but that it will also be bright.

Waldo Bowman in Asia . . .

ENR's Editor filed this story from Tokyo after 10 days traveling up, down and across Japan. Next report from his current round-the-world trip will cover Japan's spectacular dams and will appear in the Dec. 8 issue. By then, Mr. Bowman's quest for stories will have had him in Formosa, Hongkong, Thailand, West Pakistan, Iran and Lebanon.

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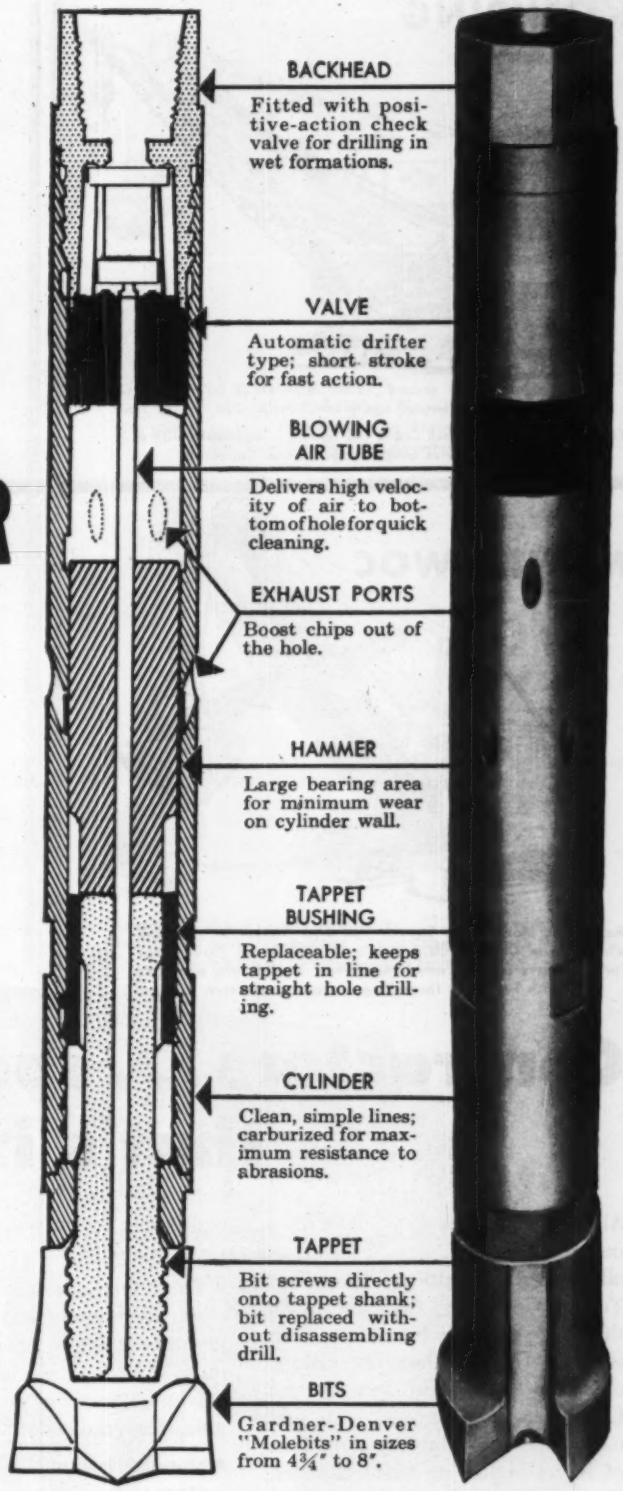
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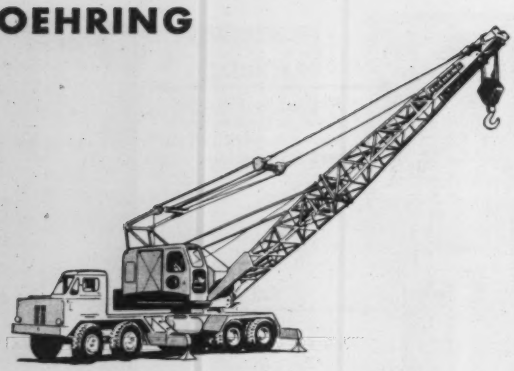

Koehring Model 445 Truck Crane (45 tons) . . . available with a Twin Disc 1500 Series Single-Stage Torque Converter.

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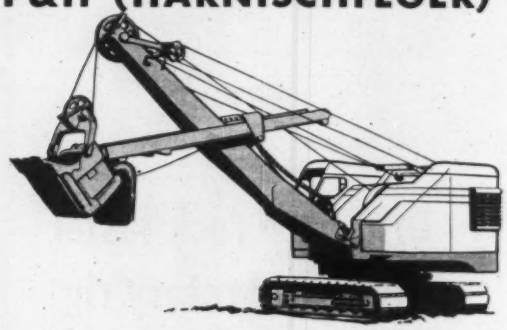

P & H (Harnischfeger) Model 655B with 1½-yard bucket, available with a Twin Disc 11,500 Series Three-Stage Torque Converter. P & H also offers 3½-yard 1055 Series with Twin Disc 13,800 Series Torque Converter.

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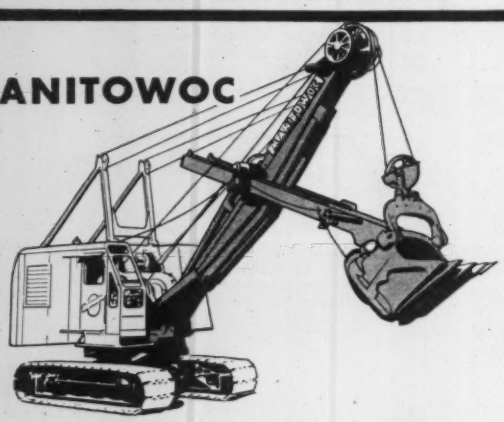
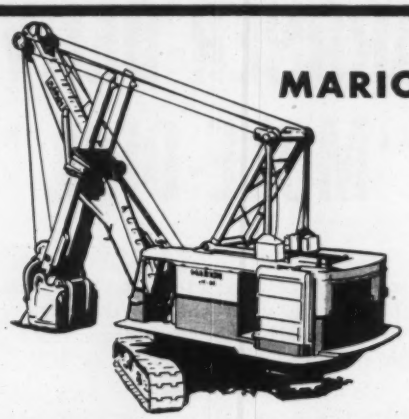


Manitowoc Model 3600 Shovel with 3-yd. bucket . . . offered with a Twin Disc 10,000 Series or 11,500 Series Three-Stage Torque Converter. Six other Manitowoc Models are available with Twin Disc Three-Stage Torque Converters.

MARION



Marion Type 111-M Shovel with 4-yd. bucket, offered with a Twin Disc 11,500 Series Three-Stage Torque Converter. Six other Marion Models, from ¾ through 3 yds., available with Twin Disc 10,000 Series Three-Stage Torque Converters.

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All of the machines shown here have one thing in common . . . each is offered with an optional Twin Disc Torque Converter, the same make that's in your crawler tractor fleet, whether the machines are yellow, orange or red. Twin Disc Torque Converters have proved their efficiency and dependability in millions of hours of use in Allis-Chalmers, Caterpillar and International crawler tractors!

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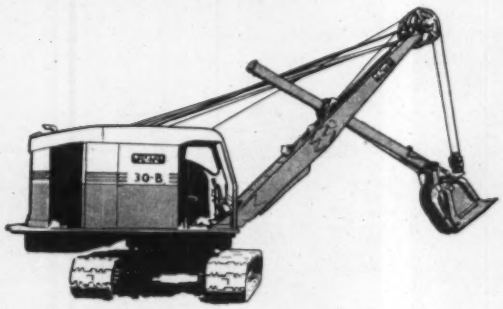
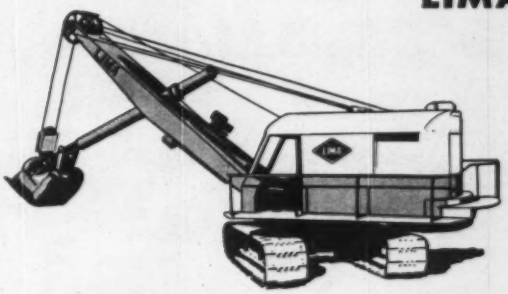


Bucyrus-Erie Model 30-B Shovel with 1-yard bucket . . . available with a Twin Disc 10,000 Series Three-Stage Torque Converter.

LIMA



Lima Type 703 Shovel with 1¾-yd. bucket . . . available with a Twin Disc 10,000 Series Three-Stage Torque Converter, which is also offered on Lima Type 803 2½-yd. Shovel. Other Lima products offer Twin Disc Torque Converters and PTO's

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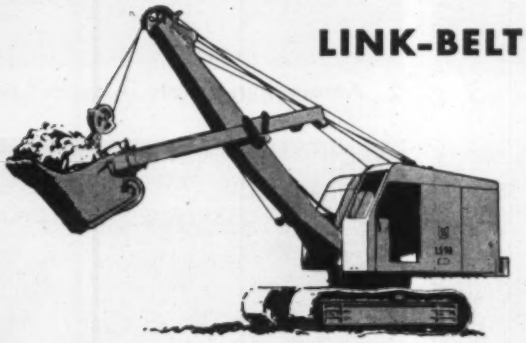

Link-Belt Speeder Model 98 with 1-yd. bucket . . . available with a Twin Disc 1500 Series Single-Stage Torque Converter.

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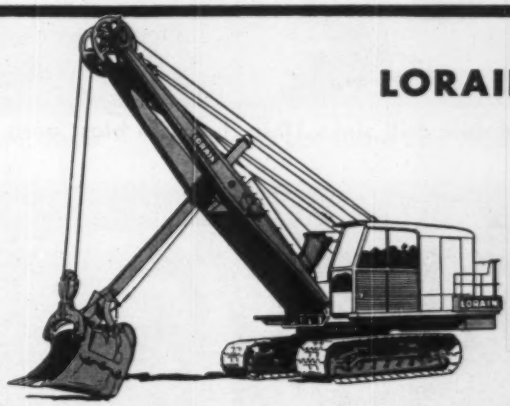

Lorain-85A Shovel with 2½-yd. bucket . . . offered with a Twin Disc 10,000 Series Three-Stage Torque Converter. Twin Disc also available on Lorain-26 Model ¾-yard Shovel.

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TWIN DISC
Torque Converters

1. Mobile drill sinks 10-in. holes in blast area.

2. Ammonium nitrate is trucked to

5. Blast is detonated—80 or 90 holes, 40 to 50 ft deep.

6. Three shovels work the piles of

Blasters Dig a Spillway With

A rockfill dam now backing up a power pool on Alabama's Black Warrior River was blasted mostly out of its own spillway by fertilizer-grade ammonium nitrate.

The spillway channel, a 4,800-ft-long cut skirting the right abutment, contributed 3.8 million cu yd of rock for the 5 million-cu yd embankment. The job took close to 2,000 tons of the blasting agent. The average shot developed 100,000 cu yd of rockfill, the maximum 120,000 cu yd. Each shot took four or five days to set up, covered up to an acre or more and developed the rock to a depth of 40 to 50 ft.

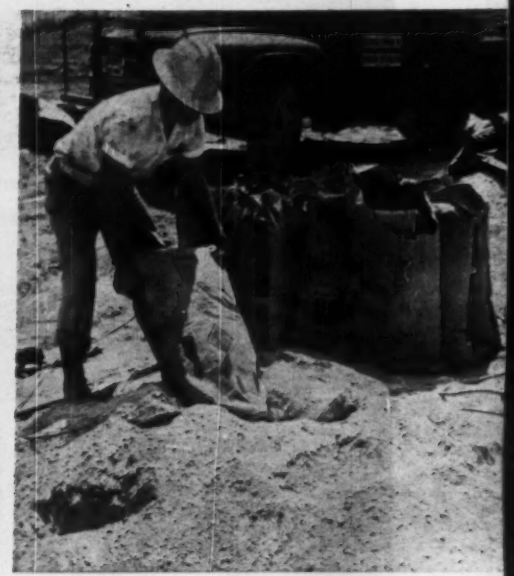
The embankment is Alabama Power Co.'s Lewis Smith Dam, on the Black Warrior's Sipsey Fork, about 35 miles northwest of Birmingham. It is a 300-ft-high, sloping-core rockfill.

• **Spillway is shaped rock**—The spillway channel takes off from the reservoir just upstream from the right abutment. Unlined, it cuts through sandstone bedrock overlain with weathered sandstone. The overflow crest, shaped from bedrock, is aligned with a convex curve upstream. It is 980 ft long. Below the crest, the channel quickly narrows to 350 ft and runs about 2,400 ft to Mill Creek, which will convey any spillage the remaining four miles back to the river.

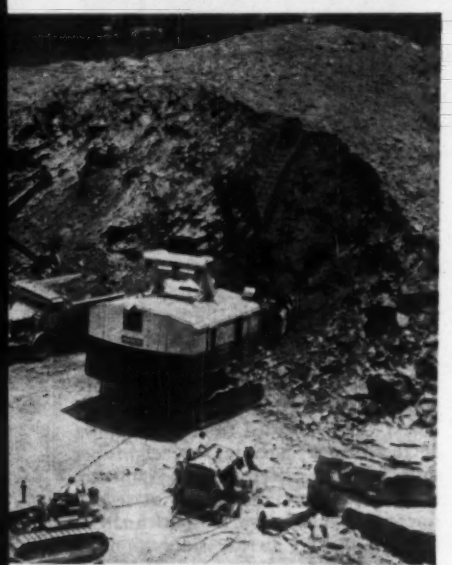
The weathered sandstone overburden

each hole and unloaded.

3. Oil is hosed into bags.



4. Holes are fused and loaded.



shattered rock that remained.

7. The result: a spillway 350 ft wide, 100 ft deep.

Fertilizer

of the spillway and some adjacent areas was excavated with scrapers and pushers and used for the impervious core of the dam. The bedrock was then developed for the rockfill zones by blasting. The cut averages about 70 ft deep.

• **Blasting procedure**—The contractor excavated the entire spillway with fertilizer-grade prilled ammonium nitrate. This was the technique:

(*Turn the page*)

ROCKFILL DAM contains both the rock and the overburden from the spillway cut.

• Holes 9⅞-in.-dia and 40 to 50 ft deep were sunk with a mobile tower drill over the area to be blasted.

• A truck loaded with ammonium nitrate moved through the area and workmen deposited the designated number of 80-lb polyethylene bags of the blasting agent at each hole.

• The bags were set upright and slit open at the top.

• Fuel oil was hosed into each bag from an oil truck passing through the area.

• Detonating fuse of 150-grain weight was weighted on the end with a rock and lowered into hole, extending a little above the top.

• The bags were emptied into the holes and stemmed as required with tamped earth.

• The system was connected on the surface with 50-grain detonating fuse.

• The holes were fired.

Blast-hole depth was dictated by shovel size. The four shovels—3- to 6-cu yd capacity—used to handle the rock after blasting were able to work efficiently at the rock-pile heights resulting from 40 to 50-ft-deep holes, but deeper holes would have made the job awkward.

The ammonium nitrate was delivered to the site by the manufacturer as needed and unloaded directly at the holes.

The sensitizing operation speeded up considerably during the job. Each 80-lb bag required one gallon of fuel oil. At first, the oil was poured into a one-gallon bucket and then emptied into a bag of blasting agent. Later, it was hosed into the bucket, then poured into the bag. Finally, the operator developed enough estimating skill to hose the oil directly into the bag.

Many holes were too wet for loose ammonium nitrate. They were first waterproofed with 10-in.-dia polyethylene tubing. The plastic was tied at the bottom to seal out water, weighted with rocks and lowered into the hole. The hole could then be loaded the same as a dry bore. An earlier wet-hole method, abandoned as too expensive, involved the use of 3-ft-long waterproofed paper tubes of ammonium nitrate, each containing a detonating charge of dynamite. The hole was loaded to a depth above water level with the tubes, then with loose prills the remainder of its depth.

• **How rock size was controlled**—The holes were spaced and stemmed according to the degree of fracturing required. For large rock, a typical grid spacing for holes was 28 x 22 ft, with the 28-ft dimension parallel to the bench face. As much as 20 ft of the hole depth was stemmed in this case. For smaller rock, a typical spacing was 24 x 22 ft, again with the longer dimension paralleling the face. Stemming for small rock was as little as 5 ft of the depth. Spacing for some shots ranged up to 36 x 36 ft.

The contractor excavated the bottom of the spillway and a bench parallel to the spillway axis at the same time. The full depth of the spillway cut was 100 ft or under except for one or two spots where rising surface grades made it slightly deeper. The bench was ramped to the spillway floor for equipment access.

Efficiency of the ammonium nitrate in terms of rock production varied from 0.36 lb to 1 lb per cu yd. With 20 ft of stemming, it ran about 0.5 lb.

• **Blasts were all big**—Shots averaged about 100,000 cu yd and ran as high as 120,000. A big one might cover an area 200 ft long parallel to the bench face and 200 to 250 ft deep (nine rows of holes). Delays varied from a minimum of three to a maximum of eight per shot. Delay patterns were standard, starting with a center breakout several rows deep and progressing to final sequences parallel to the sides to minimize overbreak.

It took four or five days after a shot to muck, drill and get ready for another one. Operations were on two shifts. The ammonium nitrate delivery was held off till the last because its susceptibility to moisture damage made quick loading and firing imperative. Equipment was cleared from the blast area at the end of the last shift on the day preceding a shot. The holes were loaded and set off early the next morning.

The contractor expressed enthusiasm over the ammonium nitrate. It is cheaper to use than dynamite, he said, and much safer. The detonating fuse eliminates any need for caps in the loaded blast holes, he said, and thus eliminates the danger of accidental detonation by electromagnetic energy (ra-

POWERHOUSE will have one 80,000-kw unit now, another later.

dio transmission, static from lightning). Caps were installed at the surface in the final operation. He also said ammonium nitrate does not cause headaches such as those some workers get from handling raw dynamite.

• **Multipurpose reservoir**—Power is the primary purpose of the Lewis Smith project, but the development will also provide additional benefits.

The reservoir provides a high degree of flood protection. It can contain the maximum flood of record on top of normal pool without spilling.

Storage and stream regulation provided by power releases will give Birmingham a dependable additional source of industrial water, which will have the advantage of being cooler by virtue of its reservoir storage period. A 60-in. pipeline for this water will run to the city from an intake a half mile below the dam.

• **The embankment**—The dam itself has certain unusual features. It is probably second highest at 300 ft among sloping-core rockfills in the U. S., after Idaho Power Co.'s Brownlee Dam, which is 395 ft high. And a bigger than usual proportion of the rockfill material was compacted mechanically. About 2.3 million of the 3.8 million cu yd of rockfill was compacted with 50-ton rubber-tired rollers.

• **Construction**—The streambed was stripped to bedrock along the full length of the dam at the start of the job and the abutments were similarly stripped as the embankment rose. A grout curtain was injected along the full length also, and up the abutments to the elevation of the spillway crest. Grout holes were drilled 150 ft deep, 40 ft c-c, with intermediate holes where grout acceptance indicated the necessity. An area 50 ft wide on either side of the curtain was blanket grouted 15 to 20 ft deep.

Impervious core material was developed from overburden along and adjacent to the spillway channel by self-propelled scrapers assisted by pushers. After the scrapers dumped the material on the fill, it was spread by graders and bulldozers and compacted by sheepsfoot and rubber-tired rollers. Sheepsfoot rollers made two passes to break up lumps, and 50-ton rubber-tired rollers made eight passes on the average to attain the required compaction.

Core specifications called for 95% modified AASHO density (equivalent to Method C ASTM D1557-58T). It was mostly weathered sandstone, sandy, 20 to 40% passing the No. 200-mesh sieve, friable, not very plastic, about A2 under the PRA classification system, and was considered pretty good for its purpose. Natural water content was satisfactory for the most part. A sprinkler truck was brought into use infrequently on the fill to add moisture.

• **Rockfill had to be end dumped**—Rockfill material was hauled from the spillway cut to the fill by 18-cu-yd bottom-dump trucks at first and, later, when the bottom dumps proved unsatisfactory, by 15- and 20-cu yd end-dump trucks.

Rockfill 1 cu ft and smaller, about 2.3 million cu yd, was spread by tractors with rock rakes and dozer blades, wet down (but not sluiced), then compacted by eight passes of a 50-ton rubber-tired roller.

Rockfill from 1 cu ft up, about 1.5 million cu yd, was dumped at the top of the slope, pushed over the edge by rock rake and sluiced by direct jet from a monitor, with a 3-in. nozzle. Two monitors—one at the upstream toe, one downstream—worked the fill.

There are three filter zones, all different in gradation: No. 4-mesh to 3 in.; No. 100-mesh to ¾ in.; and 8 in. and smaller, unscreened. The first two, located on the downstream side of the earth core, contain the only processed materials in the fill. They were produced from sandstone by a crushing mill on the site.

The embankment is 2,200 ft long.

(*Continued on p. 50*)

Ammonium Nitrate in Brief

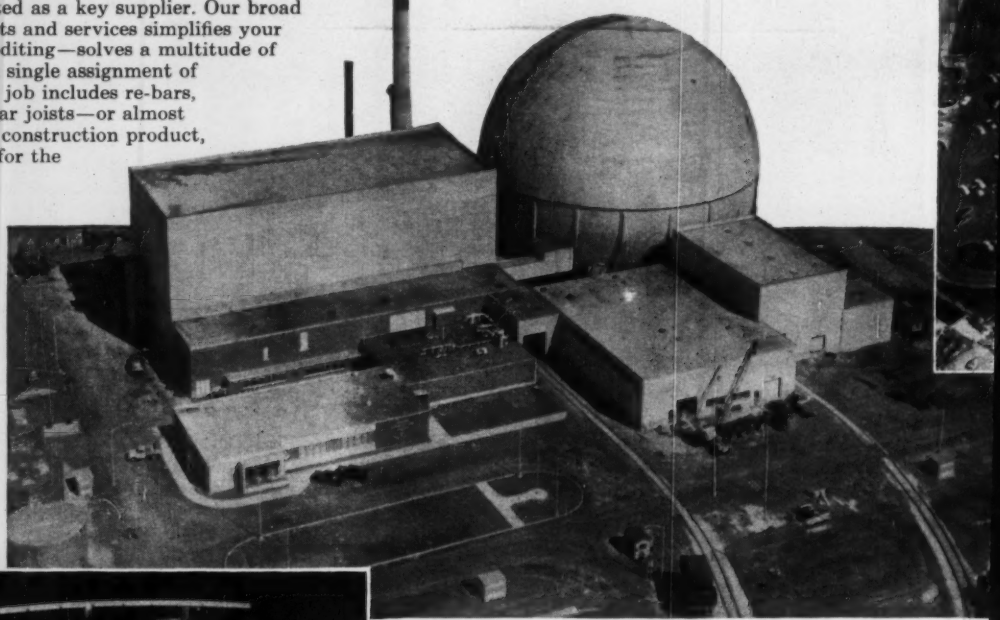
Ammonium nitrate is a long-used ingredient of commercial explosives, but it has achieved prominence as a site-mixed blasting agent only in the last few years. Its principal attraction is low cost—3 to 5 cents a pound in bulk and 6 to 10 cents premixed in cartridges, compared to 20 to 30 cents a pound for dynamite in cartridges. However, other qualities must be considered.

The material is much less sensitive than dynamite. On the one hand, this increases the difficulty and expense of detonating it and also adds to the possibility of misfire or faulty detonation. This characteristic makes the material in general less suitable for small boreholes than big ones. On the other hand, the insensitivity permits rougher handling, obtains lower freight rates and simplifies the usual precautions required in storing and using explosives. Ammonium nitrate sensitized with fuel oil detonates at a slower rate—about 8,000 ft per sec compared to rates up to 15,000 ft per sec for dynamite. The fast rate is generally better for fracturing hard rock. The slow rate is satisfactory for soft rock. Ammonium nitrate produces a greater volume of gas than other explosives generally. This works to advantage in heaving a great volume of material. The blasting agent is rendered insensitive by water; therefore, in wet ground or under water, it can be used only with special precautions or in special mixes.

HERE'S HOW RYERSON SERVES THE CONSTRUCTION INDUSTRY ON THE IMPORTANT JOBS

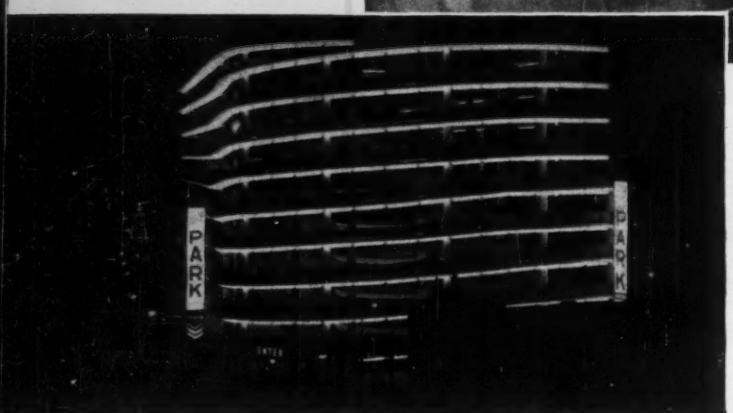
From re-bars to roofing, get whatever you need from a single source—Ryerson

Wherever you find important construction projects under way, you are more than likely to find a contractor depending on the unequaled experience and service capacity of the Ryerson organization. The examples shown here are but a few of the projects for which Ryerson was selected as a key supplier. Our broad range of construction products and services simplifies your buying, scheduling, and expediting—solves a multitude of troublesome problems with a single assignment of responsibility. Whether your job includes re-bars, post-tensioning assemblies, bar joists—or almost any other steel or aluminum construction product, you can depend on Ryerson for the ultimate in service.



Nation's largest all-nuclear power station contains 2850 tons of re-bars from Ryerson. Foundation and shielding alone for the nuclear reactor assembly contain 22,000 cu. yd. of concrete, reinforced with re-bars from Ryerson.

Operator—Commonwealth Edison Company. Prime contractor—General Electric. Engineer-constructor—Bechtel Corporation.



Big new Seattle garage—a 10-story concrete structure—is reinforced with 1900 tons of re-bars from Ryerson. Schedule was so tight, the elevator shaft was built first to get machinery installed and running as soon as the structure was complete. 300,000 square feet provide parking for 1270 cars.

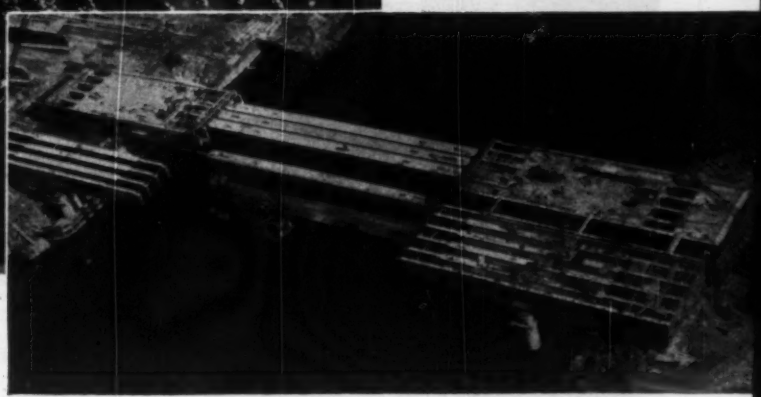
Owner—Sierra Corporation. Architect—George Applegarth. Structural Engineer—Ellison-Sedgwick. General Contractor—Utah Construction & Mining Company.

Chicago's new Exposition Center gets 3-way Ryerson service. With more than nine acres under roof, this gigantic convention hall will have over 300,000 sq. ft. of exhibition space and an auditorium seating in excess of 5000. Ryerson service includes 2200 bar joists; 15 post-tensioning cable assemblies that prestress the concrete floors; 5000 tons of re-bars to reinforce foundation, floors and walls of the entire 3-block-long structure.

Operating authority—Metropolitan Fair and Exposition Center, Inc., Chicago. General Contractor—Gust K. Newberg, Chicago. Alfred Shaw, chief architect—Carl Metz, structural engineer, Chicago.

Indiana's largest shopping center. Among the unique features of the new 55-acre Glendale Shopping Center in Indianapolis is a service tunnel—running the entire length of the center. Its 15″ concrete retaining walls are reinforced by re-bars from Ryerson—as is the center's largest building. Total re-bars from Ryerson: 840 tons.

General contractor—Glendale Center, Inc. Construction agent—Inland Construction, Inc. Developers—Landau & Heiman, Inc. Planning and design—Victor Gruen Associates.

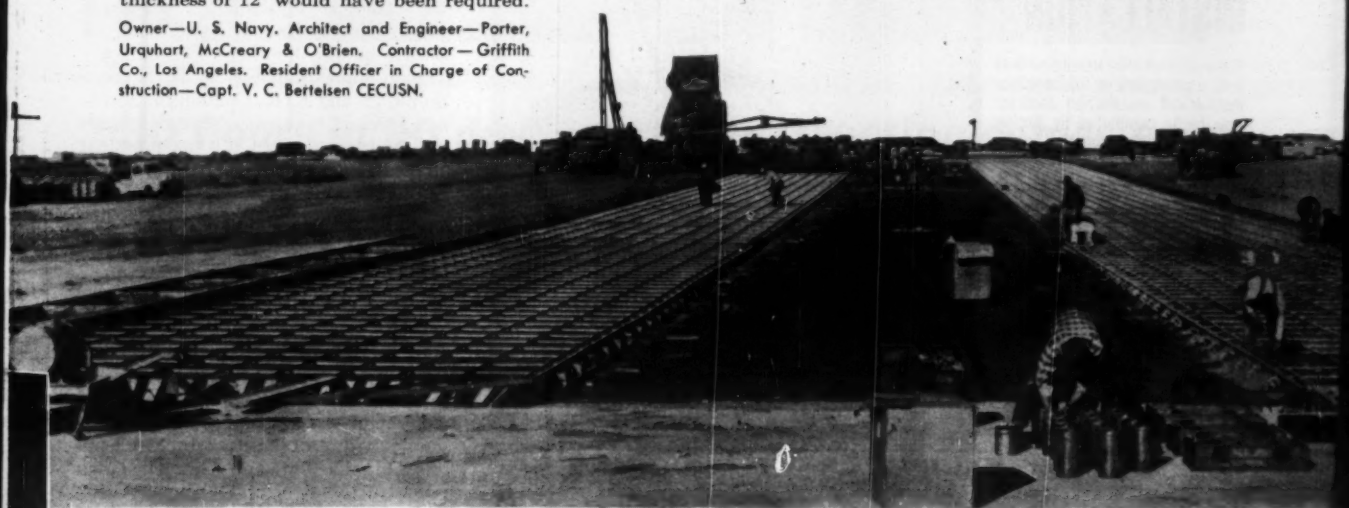


One of the longest post-tensioned projects. The new Naval Air Station, Taxiway at Lemoore, California, is a 512′ x 75′ *continuous ribbon* of prestressed concrete. The complete post-tensioning service from Ryerson includes 30 tendons that span the entire 512′ length and 205 tendons that run the width. Concrete is 6″ deep at the 312′ x 25′ center section—tapers to 9″ at edges. If concrete had not been prestressed, uniform thickness of 12″ would have been required.

Owner—U. S. Navy. Architect and Engineer—Porter, Urquhart, McCreary & O'Brien. Contractor—Griffith Co., Los Angeles. Resident Officer in Charge of Construction—Capt. V. C. Bertelsen CECUSN.

Nation's longest post-tensioned concrete span is the 320′ center span of the Oneida Lake Bridge near Brewerton, New York. The post-tensioning "package" supplied by Ryerson included more than 1000 tendon and anchorage assemblies.

Owner—State of New York Department of Public Works (C. F. Blanchard, deputy chief engineer, bridges). Engineers—Summers, Munninger & Molke, Albany, N. Y. General contractor—all construction work performed by Terry Contracting, Inc., Long Island City, N.Y.



Other Ryerson Construction Products. Complete Re-Bar Service. Post Tensioning. Open-Web Joists. Spirals. Wire Mesh. Structural Shapes and Tubing. Sheet Piling. Grating. Stair Treads. Safety Plate. Aluminum Building Products. Stainless Steel. Threaded Bars. PVC Water Stops, Tubing, Pipe, etc.

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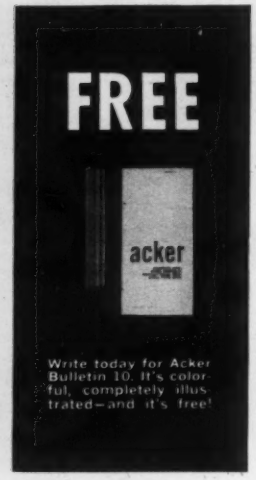
But you don't have to take our word for it! Acker diamond bits are proving themselves in the field. See for yourself. Try Acker on your next job!



Write today for Acker Bulletin 10. It's colorful, completely illustrated—and it's free!

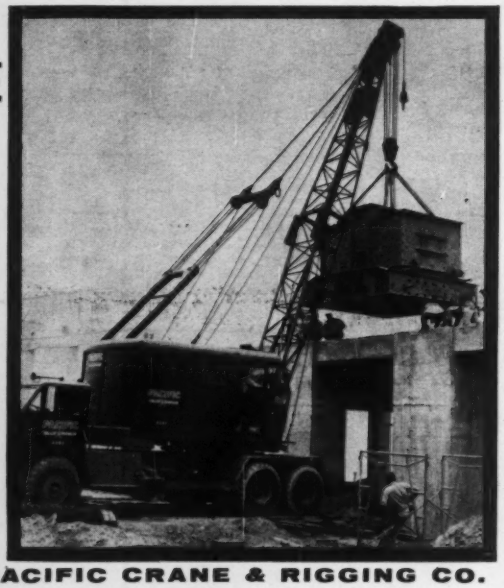
Over 40 years of experience manufacturing a complete line of diamond and shot core drills, accessories and equipment.

ACKER DRILL CO., INC. P. O. Box 830 Scranton 2, Pa.

SINGLE LIFT OR A COMPLETE INSTALLATION

Placement of this Hammermill is only a small part of the complete mechanical installation contract now being completed by Pacific Crane & Rigging for the expansion of this cement production facility.

For over 25 years P.C. & R.'s experienced personnel, and versatile equipment have successfully served the construction industry on jobs as varied as the industry itself.



Pacific Crane & Rigging Co. & Mechanical Constructors

PACIFIC CRANE & RIGGING CO.

6855 E. Rosecrans Ave., Paramount, Calif., NEvada 6-9213

POLE RIGGING • MECHANICAL PIPING • CRANE SERVICE • EQUIPMENT SETTING • MISSILE EQUIPMENT • JACK & ROLLER RIGGING • SPECIAL PROJECTS

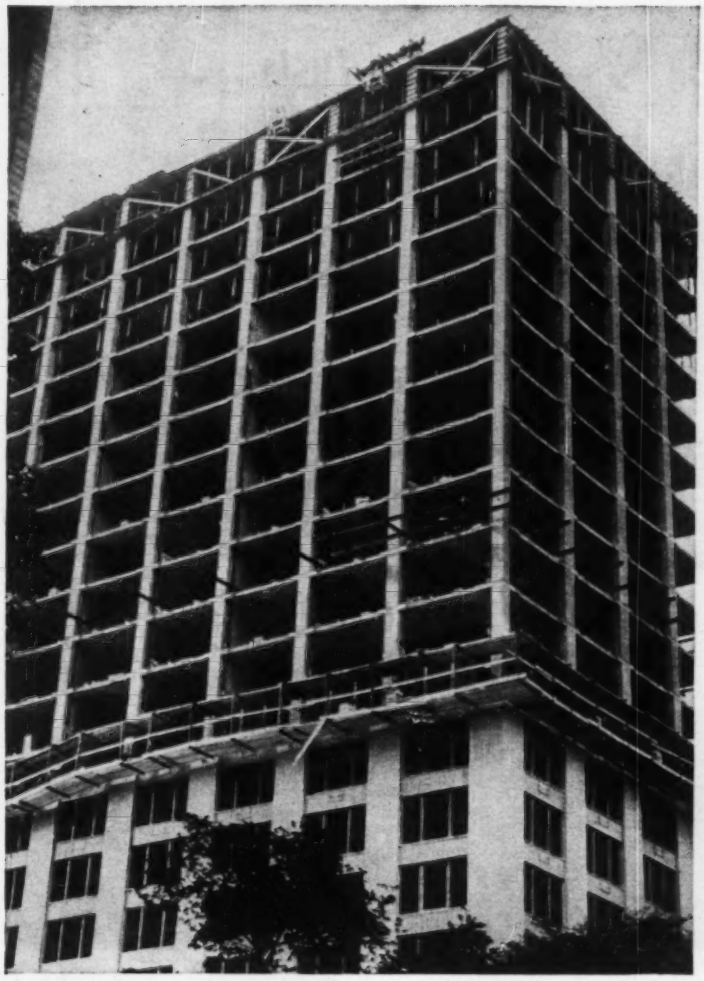
It follows an easy curve convex toward the reservoir side. Maximum base width is 1,060 ft. The crest is cambered 9 ft, sloping downward to the abutments from the high point over the deepest part of the fill.

The top is finished with a 22-ft-wide gravel-surfaced roadway comparable to general county road construction. The utility will make it available as a county road if the county wants it.

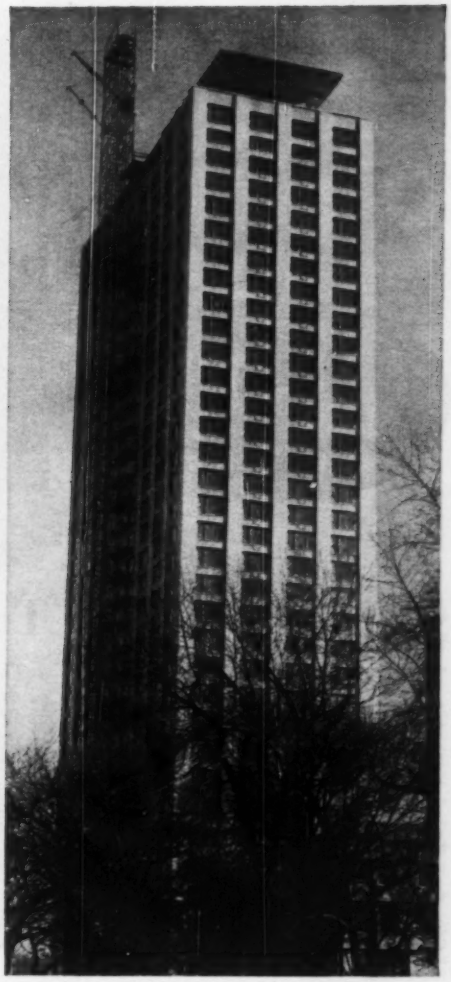
• **Diversion tunnel sealed**—During construction, stream flow was diverted through a 25-ft-dia, 1,925-ft-long, concrete-lined tunnel driven through the left abutment. Cofferdam embankments upstream and downstream protected the site.

The tunnel was plugged in October. Flow was shut off by reinforced concrete stop logs at the intake. Then the concrete floor and crushed rock underlayer in the 50-ft-long plug zone 800 ft from the tunnel intake were removed to sound rock and the walls were roughed up with a bushhammer. Concrete was pumped in from equipment outside the downstream portal, first for the bottom half of the plug, then for the top half. Cooling coils and thermometers were embedded in the concrete. Grout pipes were also embedded to permit grouting of the top half of the contact surface between old and new concrete after shrinkage.

• **Credits**—The project was designed under the general supervision of the engineering department of Alabama Power Co. by Southern Services, Inc., which is a service company of Alabama Power Co., Georgia Power Co., Mississippi Power Co. and Gulf Power Co., all owned by the Southern Co., Atlanta. Design supervision was by R. R. Randolph, Jr. and E. R. Coulbourn, Southern Services' manager of hydro projects and Alabama Power Co.'s vice president in charge of engineering, respectively. Special consultants on design and construction were James P. Growdon, Pittsburgh; Byram W. Steele, Coral Gables, Fla.; and George F. Sowers, Atlanta. Construction supervision was under Alabama Power Co.—D. F. Elliott, vice president in charge of construction; M. H. Harris, manager of major project construction; and Edwin Wagoner, project superintendent. The general contractor was Warrior Constructors, a joint venture of Farnsworth & Chambers of Houston, and Guy H. James Construction Co. of Oklahoma City—F. A. Bleeker and Vincent Hryhorchuk, project managers. The diversion tunnel was driven by Harrison Construction Co., Pittsburgh. The ammonium nitrate was furnished by Monsanto Chemical Co. It was warehoused and trucked for Monsanto by Nelson Bros. Trucking Co., Parrish, Ala.



Construction goes fast at 1550 N. Lake Shore Drive. Architects: Shaw, Metz & Dolio, Chicago, Ill. Contractor: Crane Construction Company, Inc., Chicago, Ill.



Here, the 35-story apartment building nears completion

"30 floors in 90 days! Fast construction comes easy with concrete frame and floors!"

Says **MORTON J. CRANE,** *President, Crane Construction Company, Inc.*

"This is the new 35-story apartment building at 1550 Lake Shore Drive in Chicago. With just 3 sets of forms and a precise timetable for concreting, stripping and reshoring, we made fast work of it. From the 5th floor up, we cast one story every 3 working days!

"Planning concrete frame and floor construction this way lets the other trades follow right up. When the 35th floor was cast, the building was enclosed up to the 30th floor, and trim carpenters, lathers and plasterers weren't far behind.

"And with concrete, your material is always right there when you need it. We topped out this job 2 months ahead of time. That means extra rent for the owners."

Such construction efficiencies plus the ready availability and versatility of concrete are good reasons why more and more engineers and builders today are choosing concrete for structures of all kinds and sizes.

PORTLAND CEMENT ASSOCIATION

A national organization to improve and extend the uses of concrete

FOR STRUCTURES... MODERN **concrete**

Only ONE Working Part...

THE COMBINATION CLAMP

Aligns and Locks Form, Receives Tie Rod, Holds Liner, and Provides Shelf.

SIMPLICITY — any crew with minimum experience will be able to make fast progress.

ONE WORKING PART — does 4 separate jobs.

ONLY ONE TOOL NEEDED — a hammer.

SUPERIOR All-Ply Panels are used in all types of construction—for forming ordinary residential foundations to intricate high walls.

The great strength and rigidity of All-Ply Panel Forms are provided by exterior grade 1⅛" plywood, backed at strategic areas with ½" plywood. Forms weigh less than 5 lbs. per sq. ft. and are easily handled by one man. A hammer is the *only* tool required for erection and stripping. The absence of frames permit easy stacking and transporting in minimum space. Long life and many re-uses are assured.

BUILD YOUR OWN ALL PLYS— We supply the hardware and rent the jigs. Keep you crew busy during slack season.

Write for 8 Page Bulletin AP-59

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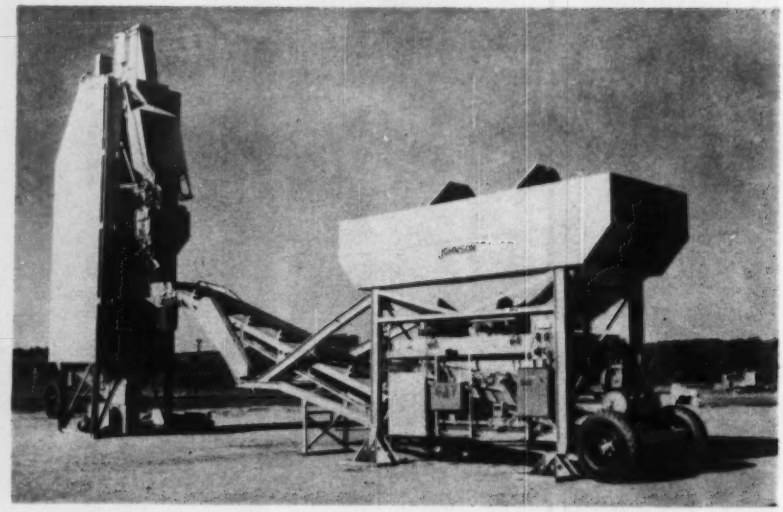
Concrete Accessories, Inc.
9301 King St., Franklin Park, Ill.
San Leandro, Calif. — Flushing, N. Y. — Houston, Texas. *Reps in principal cities.*

New Products



Transit Mix Plant Is Highly Mobile

The "Rover" mobile transit mix plant, 8-ft wide and 13-ft high, has an output of 100 to 120 cu yd per hr. It consists of two batching units—aggregate and cement—each equipped with complete running gear for attachment to a tractor. The wheels remain attached to both units during the entire operation.

During moves, the charging hopper and 3-cu yd batcher on the cement unit remain attached. When the unit is erected, the hopper and batcher hinge into position over the discharge hood. Also included on the unit are a 200-bbl-per-hr bucket elevator, a 200-bbl-per-hr screw conveyor, and a 10 cfm low-pressure air compressor.

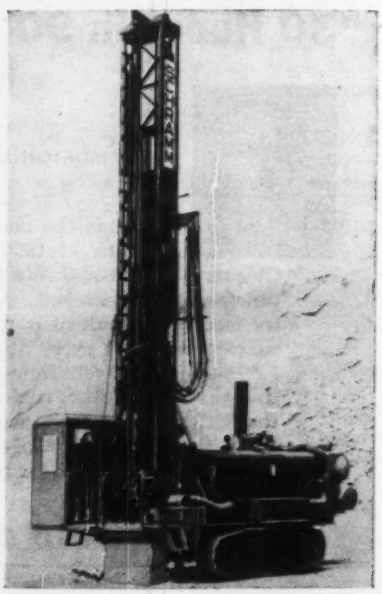
The aggregate unit includes a three-compartment bin with 30 cu yd capacity, a 3-cu yd batcher, a 30-in. conveyor, and a 10.6-cfm compressor. Full-voltage magnetic starters and push buttons for each motor are standard equipment. C. S. JOHNSON CO., P. O. BOX 71, CHAMPAIGN, ILL.

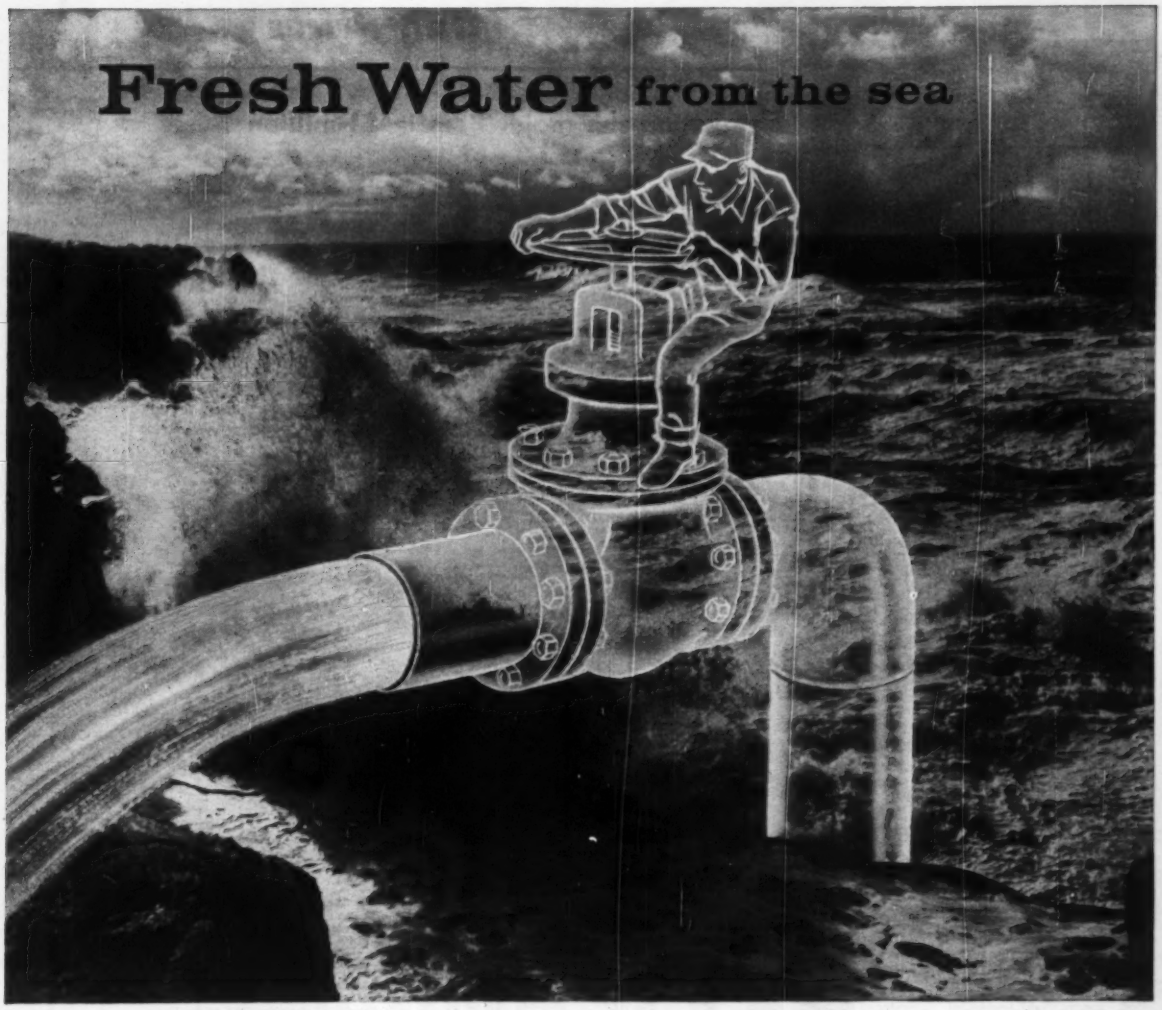
One-Man Drill on Crawler

All equipment necessary for drilling holes in quarry operations is mounted on the Model C66 ROTADRILL, a self-propelled crawler. The drilling rig is designed by the maker for one-man operation.

The top drive rotation head is powered by variable-speed hydraulic motors. Individually controlled hydraulic gear boxes drive each crawler track through roller chains. Hydraulic rams in the mast exert down-pressures to 28,000 lb. An air compressor delivering 600 cfm of free air at 100 psi is built into the rig.

A choice of masts with either 25- or 35-ft travel is available. A rack mounted in the mast can be loaded with extra 4½-in.-dia drill pipe. With the shorter mast on the machine the operator can drill to 100-ft depth without leaving the platform to add more pipe. The 35-ft mast increases this initial depth to 150 ft. SCHRAMM, INC., 900 E. VIRGINIA AVE., WEST CHESTER, PA.





Announcing a new company combining 150 years of experience

WEIR CHICAGO BRIDGE designs and builds seawater distillation plants custom engineered to produce the lowest-cost fresh water for any given situation.

This new organization combines the vast experience of two world renowned firms. G.& J. Weir Limited of Scotland has built more seawater distillation plants than all other firms combined. Chicago Bridge & Iron Company are leaders in the fabrication and erection of steel plate structures and process equipment operation on a world wide basis.

The combined resources of both firms are available through Weir Chicago Bridge to produce the most thoroughly proven distillation plant.

If you would like to consider seawater distillation to provide fresh water for domestic use or high purity distilled water for industrial use, please communicate with us at 50 Broad Street, New York 4, New York.

Real growth opportunity for engineers experienced in the design of evaporating, steam power or processing plant fields.

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answers a basic problem of most missile base construction . . . transportation time loss where the sites are dispersed in, usually, inaccessible country.

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. . . a complete program that will save you time, money, headaches . . . assure you of safety, availability and dependability . . . insure the finish of that BIG project on time.

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Excavation the major item in $1-million . . .

Tennessee Highway Job

Interstate Rte No. 75 south of Jellico, Tenn., will require close to two million cy of excavation, at 57% of the $1,258,-630 contract price of this highway job for the Tennessee State Department of Highways & Public Works. Low bidder, Greer Bros. & Young, London, Ky., was 6% under the second low of Ralph Myers Contracting Corp., Salem, Ind., and 15% below McDowell & McDowell of Nashville, high of five.

The job will center around the construction of three bridges, one set twin concrete deck girder bridge, and two concrete box types, although a considerable amount of grading and drainage will also be called for. The bridge items, valued at $117,243, account for only 9% of the total cost of the new section.

The roadway will extend from a point south of Jellico 2.056 miles to the Tenn.-Ky. state line. Of the total length, 200 lf will be bridge, and 2.018 miles will be road. The distance from the railhead will vary from 0-2 miles, and all transportation will be either rail or highway.

Wage rates determined by the U. S. Department of Labor, and prevailing in Campbell County, include: bricklayer, $3.25/hr; cement masons, $2.50; ironworkers, $3.10/hr structural & ornamental, $3.00/hr reinforcing; carpenters, $2.55; piledrivers, $2.55; bulldozers & elevating grader, $2.35; tractors over 40 hp, $2.20/hr; $1.35/hr for laborers; $2.00 for powderman; $1.60 for pipe layer; and $2.25/hr for distributors, bituminous surface.

The bidding included:

1C	Greer Bros. & Young, London, Ky.	$1,258,630
2	Ralph Myers Contracting Corp., Salem, Ind.	1,333,730
5	McDowell & McDowell, Nashville, Tenn.	1,478,393

Bids: 7-29-60 Items	Unit	Quantity	Unit Prices 1C	2
Clear & grub	ls	job	$5,000	$43,000
Exc, uncl rd, dr	cy	1,778,859	0.39	0.42
channel	cy	4,388	0.50	0.80
borrow	cy	86,454	0.25	0.10
Common, borrow	cy	5,000	0.25	0.50
Water, for embankment	Mgal	6,992	2.00	0.75
Bf, granular for pipe culv	cy	2,073	3.25	2.45
Stone, crushed	t	28,000	1.85	2.25
Bit mat A	t	29	43.00	38.00
B	t	40	45.00	40.00
prime coat	t	37	45.00	40.00
Aggregate min A	t	440	3.00	3.00
B	t	408	3.00	3.00
Cstg, gray iron cl 30	lb	3,380	0.15	0.20
cl 20	lb	616	0.15	0.20
Conc cl A 1	cy	2,755	41.00	42.00
2	cy	178	48.00	48.00
3	cy	787	48.00	37.00
Steel bar, reinf	lb	354,546	0.11	0.12
Pipe, conc culv 15"	lf	380	3.90	3.75
18"	lf	100	4.50	4.50
30"	lf	110	8.50	8.15
36"	lf	362	11.50	10.90
42"	lf	66	14.00	14.00
48"	lf	90	17.00	16.90
CMP culv, paved inv bit ctd 15"	lf	746	4.00	4.60
18"	lf	958	5.50	5.20
24"	lf	572	6.90	7.25
30"	lf	454	9.00	8.90
36"	lf	236	14.50	13.00
42"	lf	974	18.00	15.50
48"	lf	182	20.00	17.50
strutted bit ctd 48"	lf	1,118	25.00	19.80
CMP arch culv bit ctd 22"x13"	lf	40	5.00	5.20
CMP, drains 8"	lf	135	3.00	2.60
Masonry, brick	M	1.1	185.00	150.00
CMP culv, end section 15"	ea	5	30.00	22.50
18"	ea	7	35.00	27.20
24"	ea	3	60.00	41.20
30"	ea	2	80.00	62.45
36"	ea	2	140.00	105.30
42"	ea	6	250.00	201.00
48"	ea	8	300.00	238.10
Fence, stock	lf	19,620	0.54	0.52
Gate for ditch	sf	100	1.50	1.50
Crossing, water	lf	200	0.52	0.52
Markers	ea	89	8.00	6.80
Rip rap	cy	432	15.00	18.00
CMP perforated underdrain	lf	6,040	2.00	2.10
Seeding	unit	3,570	6.50	6.90

Bridge Items

Bids: 7-29-60 Items	Unit	Quantity	Unit Prices 1C	2
Exc, dry uncl	cy	388	$3.00	$7.00
rock, bridges	cy	20	12.00	7.00
Conc, cl A	cy	1,291.5	50.00	48.00
Steel, bar, reinf	lb	300,370	0.11	0.12
piles, 10" @ 42 lb	lf	2,699	5.00	5.00
handrail, 2 rail	lf	788	6.00	6.75

Calcium Chloride Alternate

Alternate A Calcium chloride, flake	T	28	....	90.00
Alternate B* Calcium chloride, concentrated	T	23	70.00	....

* alternate accepted

Liquidated damages: $80.00 per day
Completion time: 300 working days

Overpass—

This pedestrian overhead crossing of U. S. 421 between school buildings in Manchester, Ky., for the Department of Highways at Frankfort will be a 70-ft by 11-ft I-beam span with reinforced concrete deck and substructure. The low bid, $9,512, was placed by Dixie Bridge Co., Lexington, Ky. Completion time is 120 calendar days with liquidated damages set at $40 per day.

Wage rates include: laborers, $2.00 per hr; truck drivers (under 5T); $2.40; structural ironworkers, $3.10; carpenters, $3.05; concrete finishers, $3.00.

Bidding included:

1C	Dixie Bridge Co., London, Ky.	$9,512.40
2	C. D. Juett, Winchester, Ky.	9,576.45
5	T. C. Young Constr. Co., Williamsburg, Ky.	31,054.15

Item—Bids: 7-1-60	Unit	Quantity	Unit Prices 1C	2
Excav, struct, com	cy	25	$4.50	$6.00
rock	cy	15	10.00	15.00
Concrete, cl A	cy	28.1	90.00	75.00
Steel, reinf	lb	3,863	0.15	0.15
struct	ls	1	4,100	4,800
Handrail	lf	178	10.00	8.00
Sidewalk 4 conc	sf	58.1	4.50	5.00

Completion Schedule 120 calendar days
Liquidated damages $40 per day

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17,000 square feet of Macomber V-LOK integrate the crisp lines of Los Angeles UAW Union Service Center.
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(Photo by Julius Shulman)

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UNION

The *S. O. S. Wire Rope Organization

**Service on Schedule*

Delayed action on distress signals for wire rope can set up a chain reaction of downtime losses.

With hundreds of selected distributors surrounding a hard core of 15 strategically located and expertly staffed branch offices and warehouses Union is uniquely organized for quick rescue service.

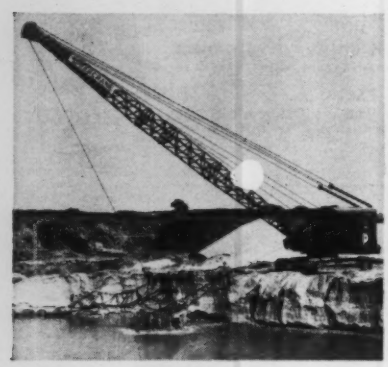
Give this same organization the opportunity and it will help cut down the need to send distress signals. How? Through Union's free preventive service. It guides you in the application of the right wire rope. It uncovers faults in equipment and abuses in wire rope operation which cause excessive wear and overloading.

Customers tell us that Union's preventive service, coupled with quality so good it makes Union the ultimate low cost rope, is helping substantially to battle against rising operating costs. Here's how customers have benefited in other ways from Union's years of preventive service.

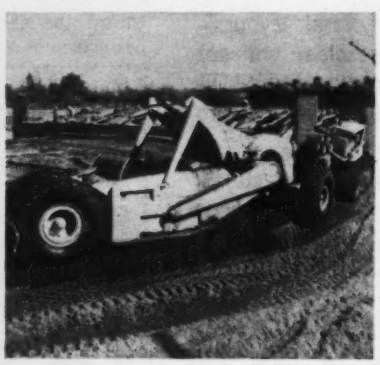
Union engineers sometimes found it impossible to select exactly the right rope from 1600 standard constructions in day to day production. To correct these situations Union laboratory researchers and engineers developed the Tuffy family of special purpose wire ropes and slings. Tuffys are engineered for equipment which imposes extraordinary tough jobs upon wire rope. Each Tuffy is a special construction but in all of them is a balance of strength, toughness and flexibility tailored for longer service life.

Tens of thousands of applications have proved Tuffys to be the ultimate low cost wire rope or slings.

Tuffy Wire Ropes and Slings are "Job Prescribed" for Tough Jobs



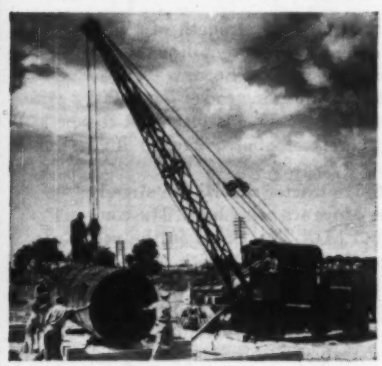
Tuffy Balanced Dragline Rope



Tuffy Balanced Scraper Rope

Tuffy Balanced Dozer Rope

Helicopters, long noted for their disaster missions, are becoming "work horses" in the air. Equipped with wire rope and slings they pick up and set materials and machinery down in inaccessible places and carry hurry up loads to otherwise easy to get to places. Photo courtesy Bell Helicopter Corporation, Ft. Worth, Texas.



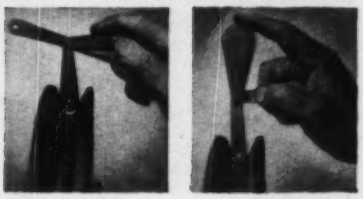
For the Right Wire Rope and Service-On-Schedule: Call Your Union Distributor

You'll find him listed in the Yellow Pages — ready with the top-quality Union Wire Rope products you need, and advice on any wire rope problem. Union Wire Rope Corporation, 2228 Manchester Ave., Kansas City 26, Mo.

Tuffy Wire Rope Tips

Money-Saving Ideas on the Use and Care of Wire Rope

How to Check Groove Diameter



Not Quite — Just Right

Groove diameter of a sheave or drum must never be less than the actual calipered diameter of the new rope. When a new rope is installed on old equipment, use a reliable groove gauge to make sure the tread or bearing surface of all sheaves is of sufficient size to avoid pinching the rope.

Recommended Sizes

Diameter of Rope	Min. Dia.	Max. Dia.
1/4 - 1/2	+ 1/64"	+ 3/32"
5/8 - 3/4	+ 3/32"	+ 1/16"
7/8 - 1 1/4	+ 3/64"	+ 3/32"
1 1/4 - 1 1/2	+ 1/16"	+ 1/8"
1 5/8 - 2 1/4	+ 3/32"	+ 3/16"
2 3/4 and larger	+ 1/8"	+ 1/4"

New ropes are usually oversize. It is advisable to have groove diameters of sheaves or drums as large as the actual calipered diameter of the new rope, or slightly larger.

Use the Right Fittings

Right fittings add life expectancy to wire rope. Fittings which derive holding power from crimping action are harmful. Shown here is a clamp that has no "wrong side"—can be put on either way. It snugly saddles the rope, grips larger surfaces in such a way that loads are carried almost entirely by friction instead of crimping action. Combined in its two parts is a thimble. The parts are interlocked to prevent collapse of the thimble, and eliminate all shear on the bolts.

Would you like a copy of a booklet in which more than a score of Tuffy Tips like those above are reproduced. If so, write Union Wire Rope Corporation, 2228 Manchester Ave., Kansas City 26, Missouri.

Tuffy Balanced Slings and Hoist Lines

UNION Wire Rope

Subsidiary of ARMCO STEEL CORPORATION

OTHER SUBSIDIARIES AND DIVISIONS: Armco Division • Sheffield Division • The National Supply Company
Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Southwest Steel Products

4-C

New Model H-120 Hough "PAYLOADER" built to scoop 20% more load because of the great strength of USS MAN-TEN and "T-1" Steels.

USS "T-1" and MAN-TEN Steels cut 1 ton of dead weight from this bigger PAYLOADER®

Two thousand pounds of weight have been chopped from the front end of this new Hough H-120 "PAYLOADER" by designing with USS "T-1" and USS High-Strength Steels. Result: one ton more capacity . . . increased reach and dumping height . . . better balance . . . stronger construction . . . lower operating costs.

This is another case where the greater tensile properties of the high-strength steels and the *extra* high strength of USS "T-1" Steel (100,000 psi minimum yield strength) made possible a superior designed machine. About 4,000 pounds of USS "T-1" Constructional Alloy Steel in ½" and ¾" plate and ½" x 5" bars are used in the boom arms, rocker arms, and bucket attachment brackets. The bucket is 5/16" USS MAN-TEN Brand High-Strength Steel—a 50,000 psi minimum yield point grade.

The bucket lift assembly was designed to a working stress, which, multiplied by a reasonable safety factor, comes up to the full minimum yield strength of "T-1" Steel. The 2,000 pounds of weight saved went directly into increased payload capacity—20%. The new "PAYLOADER" can handle 12,000 pounds instead of the 10,000 pounds of the experimental design. This is just what the customers wanted. No other steel offered such a high ratio of strength to weight.

The first 150 of these Hough tractor shovels are already giving outstanding service. More are being built. The combination of USS "T-1" and MAN-TEN Steels in the new "PAYLOADER" provides high strength with low total cost, lighter weight and freedom from maintenance.

For more information on any of these USS special steels, write to United States Steel, Room 2801, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

The Frank G. Hough Co. is a subsidiary of International Harvester Co.

USS, "T-1" and MAN-TEN are registered trademarks of United States Steel. "PAYLOADER" is a registered trademark of The Frank G. Hough Co.

This mark tells you a product is made of modern, dependable Steel.

United States Steel Corporation—Pittsburgh
Columbia-Geneva Steel—San Francisco
National Tube—Pittsburgh
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
United States Steel Export Company

United States Steel

USS

MATERIALS PRICES

Monthly Market Quotations by ENR Field Reporters

LUMBER, TIMBER, PLYWOOD PER M FT.B.M., CARLOAD LOTS F.O.B.

SOUTHERN PINE AND DOUGLAS FIR

All Southern Pine is No. 2 common or better and for No. 1 N. C. Box. (Prices in Bold Face)

All Fir boards, dimensions, planks No. 2. Fir small timbers and timbers are No. 1. Lengths up to 20 ft. (Prices in italics)

	1x6 s4s	1x8 s4s	2x4 s4s	2x6 s4s	2x8 s4s	2x10 s4s	3x12 Rgh	6x12 Rgh	12x12 Rgh	LONG LEAF Y. P. Merchantable grade up to 20 ft. 2x12 Rgh	12x12 Rgh	FIR PLYWOOD ⅜" Interior plyscored C-D gr.	⅜" Plyform grade*
Atlanta	n† **$ 90 00**	**$ 90 00**	**$ 82 00**	**$ 90 00**	**$ 90 00**	**$ 95 00**	**$125 00**	.....	.....	**$135 00**	**$155 00**	**$125 00**	**$270 00**
Baltimore	o **95 00**	**95 00**	**101 50**	**99 00**	**105 00**	**105 00**	**124 00**			**175 00**	**190 00**	173 00	265 00
	116 00g	*120 00g*	*123 00g*	*124 00g*	*124 00g*	*124 00g*	*148 00g*	*$180.00*	*$170.00*				
Birmingham	n†r **85 00**	**87 00**	**84 00**	**88 00**	**91 00**	**97 00**	**116 00**			**120 00**	**173 00**	120 30	204 50
	80 00	*80 00*	*83 00*	*81 00*	*81 00*	*98 00*	*88 90*	*85 00*	*93 00*	.....	.....		
Boston	ns **106 00f**	**107 00f**	**108 00f**	**108 00**	**108 00f**	**124 00a**				.....	.....	160 00c	290 00c
	111 00	*111 00*	*118 00*	*118 00*	*118 00*	*128 00*	*154 00*	*156 00*	*172 00*				
Chicago	** **114 00**	**117 00**	**111 00**	**125 00**	**133 00**	**134 00**	**129 00**			**157 00**	**157 00**	147 00	239 00
	120 00	*120 00*	*138 00*	*131 00*	*131 00*	*132 00*	*140 00*	*140 00*	*140 00*				
Cincinnati	n* **98 00**	**98 75**	**93 50**	**94 00**	**99 50**	**107 25**	**115 00**			**132 00**	**118 75**	92 00f	170 00f
	100 25	*103 50*	*101 00*	*103 75*	*106 50*	*116 75*	*135 50*	*135 50*	*135 50*	.....	.....		
Cleveland	o** **98 00**	**100 00**	**100 00**	**98 00**	**102 00**	**108 00**				.....	.....	121 00a	205 00
			115 00	*110 00*	*113 00*	*116 00*	*140 00*	*140 00*	*140 00*				
Dallas	‡ **95 00k**	**99 00k**	**103 00k**	**103 00k**	**103 00k**	**106 00k**	**135 00**			**138 00**	**160 00**	112 50ac	200 00ac
Denver	n* *Not in stock*		*118 00*	*118 00*	*118 00*	*120 00*	*177 00*	*197 00*	*197 00*			146 50a	233 00a
Detroit	‡ **140 00**	**142 50**	**142 00**	**138 00**	**145 50**	**145 00**				**153 50**	.....	120 00gca	209 00gca
	132 25	*132 25*	*143 25*	*141 50*	*150 00*	*155 50*	*194 00*	*211 00*	*211 00*	.....	.....		
Kansas City	tn **120 00**	**120 00**	**120 00**	**125 00**	**128 00**	**150 00**				.....	.....	135 00a	215 00a
	120 00	*120 00*	*120 00*	*125 00*	*128 00*	*132 00*	*165 00*	*225 00*	*225 00*	.....	.....		
Los Angeles	znu *91 00*	*91 00*	*91 00*	*91 00*	*91 00*	*91 00*	*130 00*	*140 00*	*140 00*	.....	.....	120 00	210 00
Minneapolis	or *140 00*	*140 00*	*140 00*	*140 00*	*140 00*	*140 00*	*185 00*	*185 00*	*185 00*	.....	.....	195 00	305 00
Montreal	*bp **83 00x**	**89 00x**	**83 00x**	**83 00x**	**99 00x**	**125 00x**				**120 00**	**120 00**	119 25	225 95
	160 00	*160 00*	*160 00*	*160 00*	*160 00*	*160 00*	*168 00*	*170 00*	*170 00*				
New Orleans	tn **89 00**	**89 00**	**90 00**	**95 00**	**95 00**	**98 00**	**126 00**			**160 00**	**155 00**	119 19	200 71
	99 00	*99 00*	*98 00*	*101 00*	*101 00*	*101 00*	*117 50*	*111 00*	*111 00*				
New York	**112 50**	**115 00**	**118 00**	**124 00**	**124 00**	**128 00**	**225 00**			**250 00z**	**250 00z**	115 75	195 60
			117 00	*119 00*	*120 00*	*125 00*	*169 00*	*174 00*	*175 00*	.....	.....		
Philadelphia	nf **108 00**	**108 00**	**112 00**	**108 00**	**110 00**	**110 00**	**125 00**			.....	.....	130 00ha	212 00ha
			125 00	*120 00*	*120 00*	*123 00*	*145 50*	*145 00*					
Pittsburgh	sf **135 00**	**135 00**	**135 00**	**135 00**	**140 00**	**140 00**	**165 00**			**145 00**	**185 00**	225 00a	295 00a
	135 00	*135 00*	*145 00*	*150 00*	*150 00*	*150 00*	*225 00*	*225 00*	*225 00*	.....	.....		
St. Louis	‡ln **111 00**	**113 00**	**121 00d**	**121 00d**	**121 00e**	**120 00e**				.....	.....	140 00ach	244 00ach
			129 00	*129 00a*	*129 00a*	*129 00a*	*183 00a*	*183 00a*	*183 00a*	.....	.....		
San Francisco	nx *67 00*	*67 00*	*80 00*	*80 00*	*80 00*	*80 00*	*88 00*	*110 00*	*111 00*	.....	.....	88–89h	160–163j
Seattle	n† *54 00*	*57 00*	*67 00*	*68 00*	*68 00*	*71 00*	*87 50*	*86 50*	*87 50*	.....	.....	110 00aeg	200 00aeg
Toronto	* **82 00x**	**85 00x**	**82 00x**	**81 00x**	**84 50**	**84 50x**	**98 00x**	.....	.....	**86 00x**	.....	216 00	216 00
	89 00	*92 00*	*100 00*	*100 00*	*103 00*	*104 00*	*118 00*	.....	.....		.....		

† F. o. b. mill. * F. o. b. city, CL, out of yard. ** F. o. b. city, CL, direct mill shipment. ‡ Deliv. to contr. CL.

LUMBER: Bold Face Type, Southern Pine. Italics Douglas Fir. *a Spruce. *b Federal tax exempt, add 6% mun. & prov. tax. *c 5M lots. *d 8, 10, & 12 ft. lengths. *e 8 to 16 ft. lengths. *f Hemlock *g No. 1 common. *j 8 ft. lengths. *k No. 3 common. *l Add 2% sales tax. *n Less 2% disc. 10 days. *o Less 2% disc. 10th. *p Less 1% disc. 10 days. *q fir: $80.25 in truck lots, fob job or CL, f.o.b. city. *r For f.o.b. city price add $8 for pine, $38 for fir eff. 1/1/58. *s asd trucklots. *t trucklots del. *u Retail LCL yard. *v Retail LCL, del. *w add 6% mun. & Prov. tax. *x add 4% sales tax. *z Hondouras Pine.

* PLYWOOD (Plyform, oiled and edge sealed): Douglas fir, 4' x 8' panels, 5-ply sanded 2 sides, carloads lots, delivered per 1000 sq. ft. surface. Seattle base price, Exterior, waterproof, ⅜", $146.00; ¼", $164.00. *a Delivered. *c Truck lots. *d A-C exterior. *e LCL. *f less 1%, 5 days. *g less 2% for cash. *h less 2% disc, 10 days *i add 2% sales tax. *j f.o.b. mill

GLASS, EXPLOSIVES, CHEMICALS, PILES, TIES

	WINDOW GLASS — Discounts from jobber's list, Feb. 1, 1950a Single or Double Strength A quality	B quality	EXPLOSIVES — Per lb. 40% Ammonia Gelatin in 50 lb. cases delivered in 500 lb. lots
Atlanta	78%	80%d	$0.2595
Baltimore	74%b	74%b	.2795
Birmingham	82%c	82%c	.2595
Boston	72+10%eq	72+10%eq	.2795
Chicago	72%	72%	.2795
Cincinnati	74%	74%	.2595
Cleveland	74-2-10%	74-2-10%	.2595
Dallas	76%	76%	.2870
Denver	73.5%	73.5%	.2795
Detroit	72-10-10%	72-10-10%	.2795
Kansas City	76-10-10%	76-10-10%	.2795
Los Angeles	$12.88/17.32	$10.45/14.13	.2795
Minneapolis	71-10%	71-10%	.2795
Montreal	40-10-5%a	40-10-5%a	23.20h
New Orleans	76%d	76%d	.2795
New York	79%	79%	.5130g
Philadelphia	80%	80%	.2795
Pittsburgh	72%	72%	.2595
St. Louis	72-10-10%ef	72-10-10%ef	.2795
San Francisco	60%	73%	.2795
Seattle	$8.85/11.55di	$6.41/8.67di	.2795
Toronto	$6.49/9.57	$5.90/8.70	

Price of 60% Ammonia Gelatin is $0.15 per lb. higher than 40% in U. S., $1.75 per 100 lbs. higher in Canada.

Glass: Jobber's list price per box of 50 sq. ft., 20 x 20 in. ss, $42.75 for A quality, $37.50 for B quality; 20 x 20 in., ds, $60.00 for A quality, $52.75 for B quality. *a sales tax extra. *b discount from 6/15/52 list. *c single strength; 83% for double strength. *d discount from 8/1/58 list. *e less 2%/10 days. *f add 2% sales tax. *g less 1%/cash. *h less 2%/cash. *i 20 boxes min.

Explosives: Cartridges of 1¼" diameter or over, in standard lengths. *g deliveries in certain areas must be by truck or by truck and boat, requiring extra charge. *h F.o.b. Beloeil (near Montreal), per 100 lb., lots under 2000#, wood cases, forcite, 40%. Forcite 60%, $24.30 in fiber cases: forcite 40%, $24.05; forcite 60%, $25.80.

40% Ammonia Gelatin price ranges in other than urban areas, per lb: (except Seismograph Grades)

	C/L 300,000 lb. lots	10,000 lb. lots	2,000 lb. lots	200 lb. lots
Group 1*	$0.2095	$0.2195	$0.2545	$0.2695
Group 2†	.2170	.2270	.2620	.2770

*All areas except those in Group 2 and N.J. cities of Bayonne, Hoboken, Jersey City, No-Bergen, Union City and Weehawken † Florida counties of Manatee, Hardee, Highlands, Okeechobee, St. Lucie and south thereof; Idaho; Maine; Montana; New Mexico counties of Catron, Socorro, Lincoln, De Baca, Roosevelt and south thereof; Texas counties of Bailey, Lamb, Hale, Floyd, Motley, Cottle, Hardeman, Foard, Knox, Haskell, Jones, Taylor, Coleman, McCulloch, San Saba, Burnet, Williamson, Milan Robertson Leon Houston Angelina, Nacogdoches, Shelby and south thereof.

PILES

Prices per linear foot, fir and pine, rough peeled, f.o.b. cars, New York. Fir based on Wash. and Ore. points to New York shipping area; pine under fifty feet based on freight from mid-South, over fifty feet, on freight from deep South.

Dimensions	Points	Length	By Rail Pine*§	By Rail Fir
12" at butt	6-in.	30 to 39-ft.	$0.42a	....
12"—2-ft. from butt	6-in.	40 to 44-ft.	.91	....
12"—2-ft. from butt	6-in.	45 to 49-ft.	.97	....
12"—2-ft. from butt	6-in.	50 to 54-ft.	1.01	....
12"—2-ft. from butt	6-in.	55 to 59-ft.	1.07	....
14"—2-ft. from butt	6-in.	60 to 64-ft.	1.14	....
14"—2-ft. from butt	6-in.	65 to 69-ft.	1.21	....
14"—2-ft. from butt	6-in.	70 to 74-ft.	1.34	$1.40
14"—2-ft. from butt	6-in.	75 to 79-ft.	1.41	1.40
14"—2-ft. from butt	5-in.	80 to 84-ft.	1.54	1.45
14"—2-ft. from butt	5-in.	85 to 89-ft.	1.67	1.54

* Pine piling over 90 feet available only in limited quantities. § ASTM Class B
* a, trucked in from N. J.

RAILWAY TIES

Prices f.o.b. per tie box carload lots:

		8" x 8" x 8' Untr.	8" x 8" x 8' Tr.	7" x 8" x 8'8" Untr.	7" x 8" x 8'8" Tr.
Birmingham*	Hardwood, Grade 3	$1.70	$2.55	Gr. 5 $2.25	$3.33
	Grade 2	1.50	2.35	" 4 2.10	3.18
	Grade 1	1.15	2.00	" 3a 1.70	2.78
Chicago	Red Oak	2.85–3.00	4.00a–4.10	3.90	4.75–5.00
New York	Mixed Hardwood	3.45	5.10	4.30	6.50
	Mixed Oak	3.55	5.20	4.40	6.60
Philadelphia	Mixed Oak	3.80i	3.97	....	4.57
St. Louis	Mixed Oak	2.65	3.75a	3.10h	4.20ah
San Francisco	Douglas Fir	1.90ef	3.05ef	2.20ef	3.10ea

Tr.—Treated; Untr.—Untreated. aCreosoted. c Empty cell. e Green f f.o.b. cars. g 7 x 9 x 8'8" * Add 75¢/tie freight charge to Birmingham. *h 7" x 9" x 8½". *i Mixed Hardwood

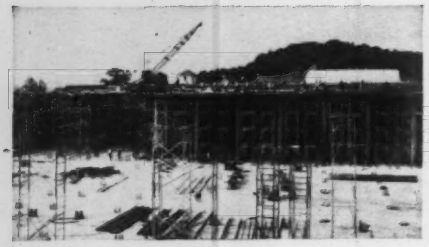
CHEMICALS

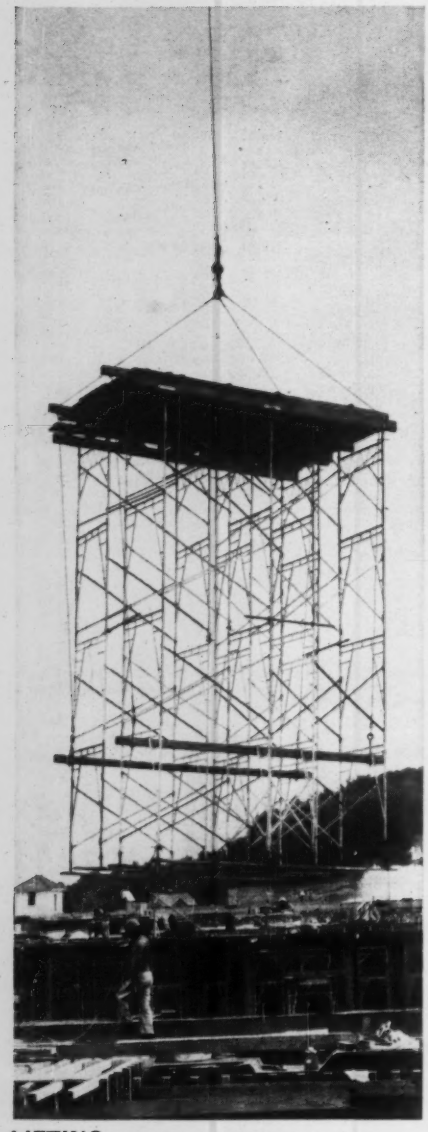
Water, sewage treatment, road work, carlots, f.o.b. works

Chlorine cylinders, liquid, per lb. freight allowed, N.Y. State	$ .11
Calcium chloride, 77–80%, flaked, 100-lb. paper bag, ton	32.00
Silicate of soda, 52 deg., in drums, per 100 lb.	2.65
Soda ash, 58%, in paper bags, per 100 lb. dense	1.90
Sulphate of aluminum, commercial, in 100-lb. bags	2.05
Sulphate of copper in bags, 99% per 100 lb., reg., 25.2% copper content	13.00

See following ENR issues for OTHER PRICES:

- Wage Rates, Building Board, Lath, Insulation: Last, Oct. 3; Next, Dec. 8.
- Cement Aggregate, Ready-Mixed Concrete; Asphalt: Last, Nov. 10; Next, Dec. 8.
- Iron & Steel Products, Pipe: Last, Nov. 17; Next, Dec. 15.
- Clay Products, Lime, Plaster, Paint, Roofing: Last, Oct. 27; Next, Dec. 22.





LIFTING of shoring from tank to tank is rapidly accomplished by crane.

Lifting, Rolling Shoring Method Saves Time

A MINIMUM number of "Trouble Saver"® Sectional Steel Shoring frames are used for this entire job—enough for about ¼ of the roof area of one of two 300′ dia. water tanks at Provin Mt. Reservoir, Feeding Hills, Mass.

By rolling, lifting, and again rolling only this amount of shoring from pour to pour in both tanks, joint venturers, Fruin-Colnon Contracting Co. and C&C Construction Co., are saving considerable time and equipment costs.

As pour areas are completed, 13′ x 15′ "Trouble Saver" Shoring sections with formwork in place are lowered on adjustable screw legs. PS Co. hydraulic shoring dollies are moved beneath these sections which are then rolled, as shown, to new pour areas in each tank.

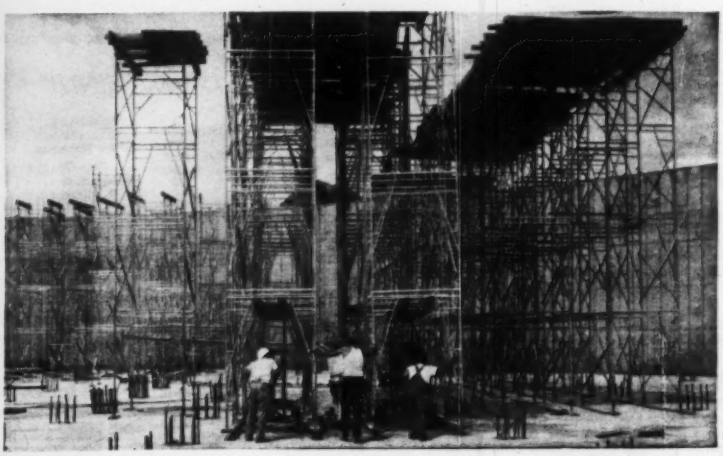
Crane lifts shoring in 13′ x 15′ sections, with all formwork attached, from the completed first tank, swings around to the adjacent second tank, lowers the sections to the concrete floor. The dollies then roll the sections into position.

This project again illustrates the extreme versatility of "Trouble Saver" Sectional Steel Shoring. The easy-to-handle "prefab" end frames are rapidly assembled to form basic, free-standing units with practically any frame spacing required. Sectional units lock atop one another to form towers.

PSCo SCAFFOLDING • STEEL SHORING • SALES • RENTALS

THE PATENT SCAFFOLDING CO., INC.

38-21 12th Street, Dept. ENR, Long Island City 1, New York
1550 Dayton St., Chicago 22 • 6931 Stanford Ave., Los Angeles 1
Branches in all principal cities
IN CANADA: Canadian PS Co., 329 Dufferin St., Toronto



ROLLING is provided by PS Co. hydraulic shoring dollies.

Construction Reports

Bids Asked—Low Bidders—Contracts Awarded—

Compiled by Business News Department—Engineering News-Record, 330 W. 42nd St., New York 36, N. Y., ELSIE EAVES, Manager
J. A. MAHONEY, M. WETZEL, M. E. SCIORRA, MARIE MORAVSIK, ELEANOR QUERET, Reports, J. H. WEBBER, E. R. HUBER, Statistics.

NEW ENGLAND

BUILDINGS—LB & CA

▲† **Paul Tishman Co., Inc.**, 21 E. 70th St., New York, N. Y., CA **$6,285,489**, 7 story POST OFFICE and COURTHOUSE, HARTFORD, CONN. General Services Admin., 19 and F Sts., Wash., D. C. CD 10/14, under LB.

▲ **Edward Packtor Co.**, 462 Silas Deane Hy., Wethersfield, Conn., CA **$1,718,712**, Fred D. Wish ELEMENTARY SCHOOL, Contract No. E 20-414, HARTFORD, CONN. Town Purch. Agt., 550 Main St., Hartford, Conn. Bids Oct. 27. CD 10/21.

MIDDLE ATLANTIC

BUILDINGS—BA

▲ **N. Y., Mount Vernon**—HIGH SCHOOL, etc.—BA 12/6—Bd. Educ., 257 4 Ave., high school, swimming pool. $7,500,000. Sherwood, Mills & Smith, 65 Broad St., Stamford, Conn., archts. Praeger-Kavanagh-Waterbury, 126 E. 38 St., New York, N. Y., engrs. CD 3/23.

▲ **N. Y., Hollis**—SCHOOL—BA 12/13—Deputy Superintendent Schools, Bureau Constr., 42-15 Crescent St., 4th Floor, Long Island City, Zone 1, general contract, plumbing and drainage, heating, ventilating, electrical work and lighting fixtures Junior High School 192, Hollis and 111 Aves., 204 and 205 Sts., Queens Boro. $3,400,000. Plans deposit $35 geenral, $15 mechanical trades. CD 7/21.

▲ **N. Y., New York**—SCHOOL—BA 12/19—Deputy Supt. Schools, Bureau Constr., 42-15 Crescent St., 4th Floor, Long Island City, Zone 1, general contract, plumbing and drainage, heating, ventilating, electrical work and lighting fixtures at Public School 116 addn., 32 and 33 Sts., between 2 and 3 Aves., Manhattan Boro. $1,-800,000. Plans deposit $25 general, $10 mechanical trades, $5 elevators. CD 4/4.

▲ **N. Y., Brooklyn**—SCHOOL—BA 12/20—Deputy Supt. Schools, Bureau Constr., 42-15 Crescent St., 4th Floor, Long Island City, Zone 1, general contract, plumbing and drainage, heating, ventilating, electrical work and lighting fixtures at Junior High School 275, Rockaway, Hegeman and Thatford Aves. and Linden Blvd., Brooklyn Boro. $3,765,000. Plans deposit $35 general, $15 mechanical trades. CD 11/4.

HEAVY CONSTRUCTION—LB & CA

▲ **NEW YORK**—State Dpt. P. Wks., State Office Bldg., Albany,
U. S. Steel Corp., 71 Broadway, New York, N. Y., CA **$4,697,005**, Alexander Hamilton Bridge superstructure, 0.29 mi., Interst. Rte. Conn. 511; Cross Bronx Expressway Cont. 1B, Proj. I-95-1(40), New York and Bronx Counties. Bids Sept. 21. CD 9/22, under LB.

▲ **Lasker-Goldman Corp.**, 50 E. 42 St., New York 17, N. Y., LB **$14,150,000**, (6 bidders), Contr. 3, structures and equipment Jamaica Pollution Control Proj. extension, Queens Boro, SOUTH OZONE PARK, N. Y. Dpt. P. Wks., Rm. 2200, Municipal Bldg., New York 7, N. Y. Bids Nov. 9. CD 11/3;
Benjamin Hochman Elec. Co., 121 Willoughby St., Brooklyn 1, N. Y., LB **$843,479**, Contr. 4, electrical work, Jamaica Pollution Control Proj. extension, Queens Boro (South Ozone Park, N. Y.);
Berk Plumbing Co., 384 Atlantic Ave., Brooklyn 17, N. Y., LB **$149,000**, (8 bidders), Contr. 5, plumbing, Jamaica Pollution Control Proj. extension, Queens Boro, (South Ozone Park, N. Y.);
H. Sand & Co., Inc., 11 Park Pl., New York 7, N. Y., LB **$192,700**, (4 bidders), Contr 6, heating and ventilating, Jamaica Pollution Control Proj. extension, Queens Boro (South Ozone Park, N. Y.).

BUILDINGS—LB & CA

▲ **Planet Constr. Corp.**, 11 W. 42 St., New York 36, N. Y., LB **$2,472,000**, (3 bidders), general contract JUNIOR HIGH SCHOOL 231, Springfield Blvd. and Conduit Ave., Queens Boro, NEW YORK. Deputy Supt. Schools, Bureau Constr., 4 Floor, 42-15 Crescent St., Long Island City 1, N. Y. Bids Nov. 10. CD 10/17;
Dierks Heating Co., 43-32 33 St., Long Island City 1, N. Y., LB **$466,325**, (3 bidders), heating and ventilating Junior High School 231, Queens Boro (NEW YORK).

▲ **Olympic Estates**, 144 E. 44 St., New York 17, N. Y., Owner Builds, **$2,000,000**, APARTMENT, GARAGE and STORES, 827-35 Second Ave., NEW YORK, N. Y. Wechsler & Schimenti, 118 E. 25 St., New York 10, N. Y., archts. CD 11/23/59.

▲ **Jiggs Lewin Co., Inc. & Modern Home Builders**, 2831 Harlem Rd., West Seneca, N. Y., Owner Builds, Total cost **$2,760,000**, (Three Year Program) First Year $1,000,000, 138 HOMES, Orchard Heights, WEST SENECA, N. Y.

▲ **Ernest Di Sabatino & Sons, Inc.**, 2601 W. Fourth St., Wilmington, Del., LB **$2,000,000**, Wilmington COUNTRY CLUB, WILMINGTON, DEL. Wilmington Country Club, Kennett Pike at Kirk Road, Wilmington, Del. Bids Nov. 9. CD 8/18/59.

SOUTH

HEAVY CONSTRUCTION—LB & CA

▲† **Alpha of Texas, Inc.**, Richardson, Tex., and **Continental Electronics Mfg. Co.**, 4212 S. Bruckner Blvd., Dallas, Tex., CA **$12,173,000**, complex short wave transmitter facility, near GREENVILLE, N. C. U. S. Information Agency, 1734 New York Ave. N.W., Wash., D. C. Bids Nov. 1. CD 11/2, under LB.

† **E & I Inc.**, 3000 W. State Rd. 84, Fort Lauderdale, Fla., LB **$2,208,132**, (23 bidders), constructing Canal 23 & Structures 48 & 97 Central and Southern Florida, Florida Flood Control Project, CIVENG-ENG-08-123-61-21, FLORIDA. U. S. Eng., Box 4970, Jacksonville, Fla. Bids Nov. 9. CD 10/17.

▲ **Duval Eng. & Constr. Co.**, P.O. Box 1588, Jacksonville, Fla., LB **$2,184,327**, 6 concrete slab deck grade separation bridges, State Rd. 115-A, west of Building and Haines St., JACKSONVILLE, FLA. Jacksonville Expressway Auth., 1022 Miami Rd., Jacksonville, Fla. Bids Nov. 10. CD 11/3.

▲ **KENTUCKY and INDIANA**—Commonwealth of Kentucky, Dpt. Hys., Frankfort, Ky.,
Ruby Constr. Co., 101 Sagg St., Madisonville, Ky., CA **$2,338,870**, bridge, grade, drain, lighting 0.373 mi. Louisville-Lexington, Proj. I-64-2(15)I, Jefferson Co. Bids Nov. 4, awarded Nov. 9. CD 11/9, under LB.

BUILDINGS—LB & CA

▲ **Burk Constr. Co.**, 12777 N. 14 Ave., Miami, Fla., CA **$2,000,000**, 14 story, 72 x 197 RIC concrete piling, Terrace Towers APARTMENT, 3 Island Ave., MIAMI BEACH, FLA. Island Venetian Constr. Co., c/o contractor. Lapidus, Kornblath, Harle & Liebman, 940 Lincoln Rd., Miami Beach, Fla., archts. Sasnett Engrs., Inc., DuPont Plaza Center, Miami, Fla., mech. engrs. Oboler & Clark, 927 Arthur Godfrey Rd., Miami Beach, Fla., struct. engrs.

▲ **Whittenberg Constr. Co.**, 2214 S. Floyd St., Louisville, Ky., CA **$5,218,000**, CHEMISTRY-PHYSICS, University of Kentucky, LEXINGTON, KY. Commonwealth of Ky., Div. of Purchases, Frankfort, Ky. Bids Oct. 25, awarded Nov. 8. CD 10/27, under LB.

MIDDLE WEST

BUILDINGS—BA

▲† Ill., Marion—PENITENTIARY—BA 1/10—General Services Admin., 219 S. Clark St., Chicago, maximum security penitentiary for Bureau of Prisons. Over $7,500,000. Heilmuth, Obata & Kassabaum, Inc., 315 N. 10th St., St. Louis 1, Mo., archt. Bids Oct. 10 rejected. CD 11/10, under LB.

HEAVY CONSTRUCTION—LB & CA

ILLINOIS—Dpt. P. Wks. & Bldgs., Div. Hys., Centennial Bldgs., Springfield,
Ill.—**Charles Ind. Co.**, RR 1, Rockford, Ill., CA **$1,899,-882**, dual concrete paving 2.35 mi. Rockford bypass, Winnebago Co.;
Ill.—**Rock Road Constr. Co.**, 5915 Rodgers Ave., Chicago, Ill., CA **$655,875**, paving, ramps FAI 90 near Elmhurst, Cook and DuPage Counties. Bids Oct. 25. CD 10/28, under LB.

BUILDINGS—LB & CA

▲ **A. Bentley & Sons Co.**, 201 Belmont St., Toledo, O., CA Est. **$3,000,000**, polymerization and compounding facilities, utilizing a computer controlled color system, CHEMICAL PLANT, ADDYSTON, O. Monsanto Chemical Co., Platsics Div., 812 Monsanto Ave., Springfield, Mass. CD 4/6.

▲ **Drake Estates Development, Inc.**, 830 E. 18th St. N.E., Stronsgville, O., Owner Builds, **$3,000,000** Drake Estates development, incl. 190 HOMES, 82 acre site along south side of Drake Rd., STRONGSVILLE, O.

PROJECTS COVERED

By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger: water supply, earthwork, waterways $53,000; other public works $88,000; Industrial buildings $110,000; other buildings $400,000. Also Foreign projects of $1,000,000 and more in size of Interest to American contractors.

By Regions & Classes of Construction
(In order of Listing)

BIDS ASKED
LOW BIDDERS
CONTRACTS AWARDED
New England
Middle Atlantic
South
Middle West
West of Mississippi
Far West

PROPOSED WORK
Water Supply
Sewers, Waste Disposal
Bridges
Streets & Roads
Earthwork, Waterways
Public Buildings
Mass Housing
Commercial Buildings
Industrial Buildings
Unclassified

In These Stages

PROPOSED WORK: Before and including appointment of engineers or architects.
BIDS ASKED: BA (new announcements only). For full calendar, see also preceding issues.
SOON LETS CONTRACT: SLC
LOW BIDDERS: LB On jobs below $500,000 in value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.
CONTRACTS AWARDED: CA Except awards to low bidders previously reported in low bidder stage.
CD dates shown are of Construction Daily Issue in which last previous report was published.
OWNERS, ENGINEERS, ARCHITECTS, CONTRACTORS are invited to report their new jobs for listing in these reports when they meet or exceed the size minimums shown above. Address these news releases to J. A. Mahoney, REPORTS, ENGINEERING NEWS-RECORD, 330 W. 42 St., New York 36, N. Y.

Symbols and Abbreviations Include:

† Federal Government
▲ Project of $1,000,000 or over.
ENR Engineering News-Record
CD Construction Daily
For additional reports see Construction Daily.

MISSISSIPPI TO ROCKIES

HEAVY CONSTRUCTION—LB & CA

▲ **TEXAS**—State Hy. Comn., Austin, Bids opened 11/9,
Tex.—**Dean Word Co.**, Box 330, New Braunfels, Tex., LB **$2,510,150**, grading, strs., base and b. conc. 7.122 mi., St. Hy. 6, Proj. E 258-9-29, McLennan Co.;
Tex.—**Uvalde Constr. Co.**, Box 10286, Dallas, Tex., LB **$534,230**, grading, storm sewers, and concrete pvt. 0.569 mi. Hy. U.S. 287, Proj. U 3(12), Wichita Co. CD 10/20.

▲ **TEXAS**—State Hy. Comn., Austin, Bids opened Nov. 10,
Tex.—**Cecil Ruby Co., Inc.**, 907 Brown Bldg., Austin, Tex., LB **$433,968**, grading, strs., fl. base and 3 crse. surf., 9.343 mi. Hy. U. S. 90, Proj. F 378(14), Brewster Co., LB **$151,333**, grading, strs., base and surf. 5.916 mi., Hy. FM 1581, Proj. R 1499-1-4, Frio Co., CD 10/14;
Tex.—**William Bros. Constr. Co., Inc., Schwope Engr. Co. and Flenniken Constr. Co.**, Box 15066, Houston, Tex., LB **$2,915,523**, grading, strs., sewer, cem. stab. base and conc. pvt. and signals, Proj. U514 (36) and (37), Harris Co. CD 10/14.

BUILDINGS—LB & CA

▲ **Dickie Constr. Co.**, 317 N. 11 St., St. Louis 1, Mo., CA **$1,861,000**, est. $1,500,000, 6 story, bsmnt. 193x231 ft. masonry, precast and prestressed concrete OFFICE, 15 and Olive Sts. for Group Hospital Service, Inc., 4904 Delmar Blvd., ST. LOUIS, MO. Blue Cross Redevelopment Corp., 407 N. 8 St., St. Louis 1, Mo. Bids Nov. 3. CD 10/25.

▲ **Fluor Corp.**, 1500 S. Atlantic Ave., Los Angeles 22, Calif., CA Est. **$9,000,000**, PROPANE EXTRACTION PLANT and LIQUID SALT CAVERN STORAGE, BUSHTON, KAN. Northern Gas Products Co., subsidiary Northern Natural Gas Co., 223 Dodge St., Omaha, Neb. CD 11/7.

▲ **C. F. Braun & Co.**, 1001 S. Fremont Ave., Alhambra, Calif., CA **$4,500,000**, design and constr. ACETYLENE PLANT, DEER PARK, TEX. Diamond Alkali Co., 300 Union Commerce Bldg., Cleveland, Zone 14, O. CD 5/16.

▲ **R. D. Lowman**, 1617 E. Missouri St., El Paso, Tex., CA Approx. **$2,365,000**, NEWSPAPER PRINTING PLANT, and 3 story PARKING GARAGE, EL PASO, TEX. Newspaper Realty Corp., Dorrance D. Roderick, pres., c/o Carroll & Daeuble, archts., 1001 E. Yandell Blvd., El Paso, Tex. W. E. Simpson Co., 945 Milam Bld., San Antonio, Tex., engr. CD 7/20.

▲ **Robert M. McKee, Gen. Cont'r., Inc.**, Box 562, El Paso, Tex., CA Est. **$7,550,000**, 18 story, bsmnt. BANK and OFFICE, EL PASO, TEX. El Paso National Bank, Texas and Stanton Sts., El Paso, Tex. CD 10/10.

▲ **Centennial Constr. Co.**, 11111 Central Expressway, Dallas, Tex., Owner Builds, **$1,695,700**, 125 DWELLINGS, Enchanted Village, GARLAND, TEX. CD 5/26.

FAR WEST

BUILDINGS—BA

▲ **Calif., Marysville**—COURTHOUSE—BA 11/30—Yuba Co., Courthouse, 135,000 sq. ft., rein.-con., steel courthouse. Over $2,500,000. Plans deposit $100. Harold M. Hansen, 251 Post St., San Francisco, Calif., archt. CD 8/3.

HEAVY CONSTRUCTION—LB & CA

▲† **Natt McDougall Co.**, Pittock Block, Portland, Ore., LB **$1,774,495**, est. $2,171,161 (4 bidders), embankment protection, Ice Harbor Dam, near Pasco, CIVENG-45-164-61-2, WASHINGTON. U. S. Eng., City-County Airport, Walla Walla, Wash. Bids Nov. 9. CD 11/2.

(Continued on page 64)

In temporary, semi-permanent, permanent service . . .
LAY MORE PORTABLE AIR, GAS, WATER LINES FASTER WITH REPUBLIC ELECTRUNITE GROOVED-END TUBING

Cut operation time and keep ahead of the job. In-the-field piping systems made up of Republic ELECTRUNITE® Lightweight Grooved-End Tubing solve fluid, gas, and air handling problems fast!

Republic's Grooved-End Tubing is engineered and produced to meet severe requirements and laying conditions of road building contractors, the mining, petroleum, construction, tank truck, and processing industries. Save installation time, dismantling time, over-all labor costs.

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Ideal for temporary, semi-permanent, permanent service. It can be used again and again—re-laid as the job moves ahead. When work is completed, simply dismantle and move to the new job site.

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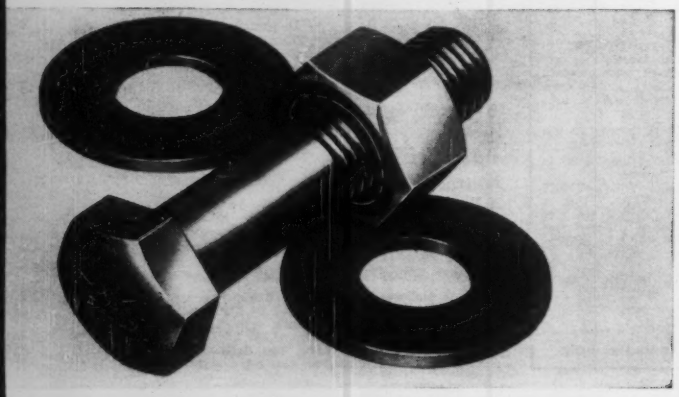
REPUBLIC HIGH STRENGTH BOLTING offers a method of construction that provides fast erection at low cost. Costly crews are reduced—two men can apply Republic High Strength Bolts. When drawn up tight, Republic High Strength Bolts provide a vise-like clamping force which transfers loads by *friction* to the structural members themselves. Fatigue life is improved. Joints are stronger than connections where loads are carried in shear. Write for additional information.



REPUBLIC SECTIONAL PLATE PIPE saves time and money with fast, easy assembly. It is engineered and fabricated at the factory—is easily assembled on the job with a minimum of labor and equipment. That's why full round 12-gage plates, 84″ in diameter, were used to construct this 90-foot cattle pass near Boise, Idaho. Send coupon for details and data.

IN-THE-FIELD OPERATORS like Republic ELECTRUNITE Grooved-End Tubing because it is uniformly round. Each length fits the other for fast make-up. Joining is quick and easy. Simply use any of a variety of available fittings and couplings to make up a complete system. Lightweight, portable grooving tools are available for field grooving field-cut tubing.

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- ☐ Sectional Plate Pipe
- ☐ Republic Steel Lockers

Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____

(Continued from page 61)

▲ **CALIFORNIA**—State Div. Hys., 120 S. Spring St., Los Angeles,

B. J. Ukropina, T. P. Polich, Steve Kral and John R. Ukropina, 201 East Las Tunas Dr., P.O. Box 105, San Gabriel, Calif., CA **$3,685,185,** 2.2 mi. eight lane freeway on Ventura Freeway, Los Angeles Co. Bids Oct. 27. CD 11/1, under LB.

▲ **CALIFORNIA**—State Div. Hys., 1120 N St., Sacramento,

Madonna Constr. Co., P.O. Box 910, San Luis Obispo, Calif., CA **$2,045,360,** grading, surf. 6.5 mi. four lane freeway and expressway on Sign Rte. 1 between Morrobay and 1 mi. south of Cayucos, incl. 3 bridges, San Luis Obispo Co. Bids Oct. 26. CD 10/28, under LB.

▲ **Einer Bros.,** P.O. Box 936, Escondido, Calif., CA **$1,934,728,** Miramar pipe line, Miramar, SAN DIEGO, CALIF. City, Purchasing Agent, Rm. 161, 1600 Pacific Hy., San Diego 1, Calif. Bids Oct. 27, awarded Nov. 10. CD 11/3, under LB.

BUILDINGS—LB & CA

▲ **Bechtel Corp.,** 220 Bush St., San Francisco, Calif., CA NUCLEAR POWER PLANT, Humboldt Bay near Eureka, CALIFORNIA. Pacific Gas & Electric Co., 245 Market St., San Francisco, Calif. Total est. $19,000,000. CD 3/18/59;

General Electric Co., River Rd., Schenectady, N. Y., CA REACTOR, Humboldt Bay near Eureka (California).

▲ **J. W. Bateson Constr. Co.,** P.O. Box 13307, Dallas 20, Tex., CA **$8,183,794,** 500 unit Capehart HOUSING, Naval Ordnance Test Station, China Lake, Spec. 30266, INYOKERN, CALIF. Dist. P. Wks. Office, 11th Naval Dist., 1220 Pacific Hy., San Diego 1, Calif. Bids Oct. 4. CD 10/6, under LB.

▲† **Roscoe-Ajax Constr. Co.,** 1107 19 St. N.W., Wash., D. C., and **Knickerbocker Constr. Co.,** 3 E. 54 St., New York, N. Y., CA **$32,512,000,** COURT HOUSE and FEDERAL OFFICE BUILDING, SAN FRANCISCO, CALIF. General Services Admin., P. Bldgs. Service, Business Service Center, 49 Fourth St., San Francisco, Calif. Bids Oct. 13. CD 10/18, under LB.

▲ **Rothschild, Raffin & Weirick,** 875 Sansome St., San Francisco, Calif., LB **$3,168,600,** (5 bidders), STUDENT and FACULTY HOUSING, CHAPEL and DINING FACILITIES, SAN FRANCISCO, CALIF. San Francisco College for Women, Lone Mountain, San Francisco, Calif. Bids Oct. 27. CD 9/27.

CANADA

HEAVY CONSTRUCTION—LB & CA

▲ **McNamara Constr. Co., Ltd.,** 42 Industrial St., Leaside (Toronto) Ont., LB **$3,954,000,** Stage 5, Lakehead Harbor Imprvs., incl. structure, services, Thunder Bay Dist., PORT ARTHUR, ONT. Dpt. P. Wks., Hunter Bldgs., Ottawa, Ont. Bids Nov. 9. CD 10/21.

▲ **Anglin-Norcross Ontario, Ltd.,** 224 Davenport Rd., Toronto, Ont., CA **$1,736,500,** Contracts UF-2 and UF-3, station finishes on four stations, Stage 1, Bloor-Danforth-University subway, TORONTO, ONT. Toronto Transit Comn., 1900 Yonge St., Toronto, Ont. Bids Sept. 26. CD 10/3, under LB.

BUILDINGS—LB & CA

▲ **Trident Constr. Ltd.,** St. Boniface, Man., CA **$1,794,140,** rein.-con. with limestone, precast concrete faced ANIMAL SCIENCE BLDG., FORT GARRY, MAN. University of Manitoba, Fort Garry, Man. Bids Oct. 12, awarded Nov. 8. CD 11/15.

AMERICANS ABROAD

HEAVY CONSTRUCTION—BA

▲ **Australia**—BA 12/20—Queensland State Govt., Brisbane, railroad line deviations on Mount Isa-Townsville Railway between Haughton and Burra Ranges. $2,250,000. Ford, Bacon & Davis, Inc., Box 443F, G.P.O., Brisbane, Queensland, Australia, engrs. CD 1/15.

C. L. GUILD and ARMCO Combine to Meet Foundation Problem at Champion Paper Project

WHEN the Champion Paper & Fibre Company, Hamilton, Ohio, decided to erect a new general office building, the site selected was formerly a low-land area. Huge quantities of fill had been deposited, but because of its "miscellaneous" nature, the ground was not suitable to carry heavy concentrated loads.

This, then, was the problem turned over to C. L. Guild Construction Co., Inc. by the general contractor, Frank Messer and Sons, Inc., Cincinnati, Ohio. Guild employed light-wall Armco Foundation Pipe by using the patented Caudill Driving Method. The pipe measured 12 ′ o.d. and had a wall thickness of 0.133 inches. The 35-ton piles were driven with an interior mandrel resting on the patented bottom closure.

Scheduled for occupancy in 1961, the 3-story T-shaped office building will have 139,000 square feet and will house a staff of 500 men and women. Also included in the building is an auditorium with a capacity of 200 and a dining room seating 225.

This is but one more example of C. L. Guild's ability to meet challenging engineering problems. C. L. Guild will welcome the opportunity to put their experience to work for you.

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PROPOSED PROJECTS

WATER SUPPLY

▲ **N. Y., Guilderland**—Town, Town Hall, wells, pumping stations, two 500,000 gal. storage tanks, 68,000 ft. transmission mains, 156,000 ft. distr. lines. **$2,870,000.** To go ahead 1963.

SEWERS, WASTE DISPOSAL

▲ **Fla., Pompano Beach**—City, City Hall, sewage treatment plant and lines. **$2,000,000.** Russell & Axon, 521 E. Lake Dr., Lake Worth, consult. engrs. CD 11/25/53.

▲ **Md., Hyattsville** — Washington Suburban Sanitary Comn., Hamilton St.,

Piscataway Sewer, sewage treatment plant, sewage pumping stations and force mains, Piscataway, **$2,184,500.** Bids 1961-1962.

Bucks Branch sewer, Gaithersburg, **$117,500.** Bids 1961.

Rock Creek to Muncaster Rd. sewer near Rockville. **$306,000.** Bids 1965.

Crabbs Branch sewer, Rockville, **$100,800.** Bids 1965.

Parkway sewage treatment plant, Laurel, **$470,000.** Bids 1961-1962.

Henson Creek to Bock Rd. sewer, Oxon Hill, **$306,000.** Bids 1965.

BRIDGES

▲ **WASHINGTON**—State Hy. Dpt., Transportation Bldg., Olympia,

King Co.—bridge over Cedar River and interchange at Maple Valley junction of State Hys. 2 and 5, **$1,700,000.** Bids about Jan. 15.

STREETS AND ROADS

▲ **Tex., Fort Worth**—City, City Hall, bond election Dec. 13, paving various streets, **$5,200,000;** street imprvs. incl. East Side Hy. and Weatherford-E. Belknap overpass, **$3,950,000.** CD 11/21/58.

EARTHWORK, WATERWAYS

▲ **Mississippi**—U. S. Eng., P.O. Box 60, Vicksburg, Miss., Greenville Harbor, Mississippi River. Total cost **$2,650,000.** $150,000 appropriated.

UNCLASSIFIED

▲ **Tex., Fort Worth**—TRAFFIC SIGNALS, etc.—City, City Hall, bond election Dec. 13, traffic signals and street lights, **$1,500,000.**

PUBLIC BUILDINGS

▲ **Ark., Hot Springs**—HOUSING—City, City Hall, 375-unit low-rent housing. **$3,000,000.**

▲ **Hawaii, Halawa**—FIREMAN TRAINING CENTER—City and Honolulu County, Punchbowl and King Sts., plans by C. J. Kim, 1012 Piikoi St., Honolulu, Hawaii, fireman training center. **$10,558,000.** CD 10/27.

▲ **Mass., Plymouth** — REGIONAL HIGH SCHOOL — Plymouth-Carver Regional School Dist., Lincoln St., plans by Korslund, LeNormand & Quann, Inc., 506 Washington St., Norwood, Regional High School, Nook Rd. **$1,725,000.** Anderson & Crawley, Warren Ave., Plymouth, Mass., assoc. archts. Tiot Engineering, Inc., 506 Washington St., Norwood, consult. engr. CD 2/19/59.

▲ **Minn., Chaska** — SCHOOL — Bd. Educ. Independent School Dist. No. 112, defeated **$1,700,000** bonds Nov. 1, high school, etc. CD 10/22.

▲† **Nev., Mercury** — TEST CELL D — Atomic Energy Comn., 1235 Main St., Las Vegas, plans by Aetron Div., Aerojet General Corp., archt.-engr., 410 N. Citrus Ave., Covina, Calif., multi-story Test Cell D, Rover Test area, Nevada Test site. **$7,000,000-$8,000,000.** CD 9/12/58.

▲ **N. J., Hackensack** — SCHOOL RENOVATION — Bd. Educ., 355 State St., plans by Charles S. Cleveland, 214 Main St., renovation State Street School to Junior-High School. **$2,500,000.**

▲ **N. J., Hackensack**—FIRE, POLICE, CIVIL DEFENSE CENTER—Bergen Co. Freeholders, Admin. Bldg., plans by Charles S. Cleveland, 214 Main St., fire, police and civil defense, Mahwah. **$1,500,000.**

(Continued on page 66)

Look what came in with the tide

The world's largest double track vertical lift span was built on barges and floated into a gap in the Delair, Pa. bridge. The ebbing tide settled it into place where, three days earlier, lifting barges had removed a fixed span during flood tide. ☐ In operation, this 542′ through-truss lift span will increase channel clearance to 500′ and eliminate an old navigational problem. The position of the old swing span required a hazardous curved channel with only 125′ clearance. ☐ Delaware River traffic will use the old channel until the lift span is in operation. Then a new channel will be dredged and the swing span fixed in place. Two new piers were constructed and the adjacent span was shortened to accommodate the new lift span and two tower spans. Designed for the Pennsylvania Railroad by Hardesty & Hanover, consulting engineers, this 2,682-ton structure is the heaviest floating operation ever handled by American Bridge. This work is being done under the supervision of the Pennsylvania Railroad. ☐ For more information about our construction services, write or call our nearest sales office.

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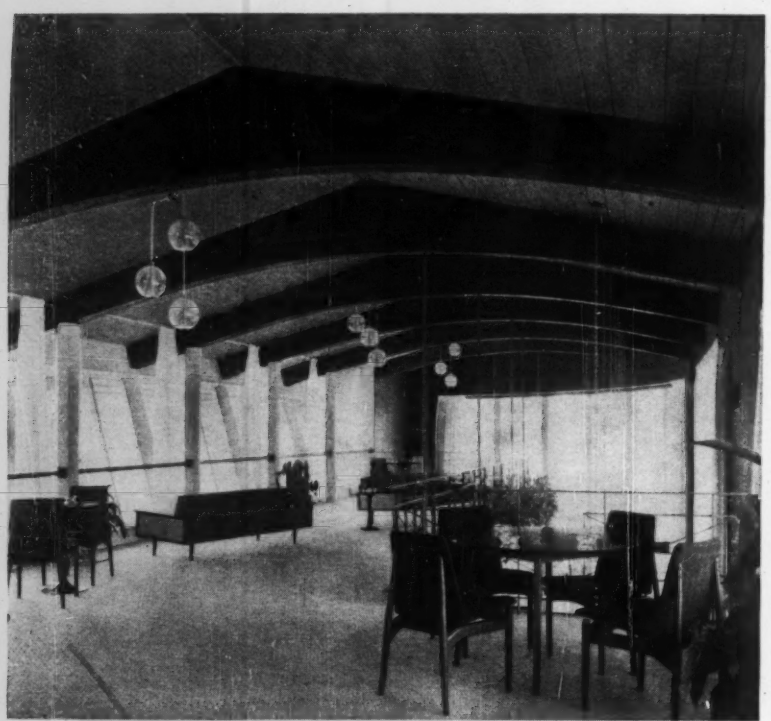
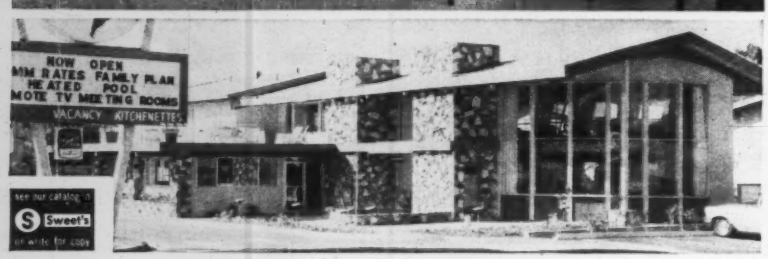
American Bridge Division of United States Steel

USS

Guest Lounge of Los Altos Inn, Los Altos, California. Designer: Stan Mattson, Mountainview, California. Contractor: Surety Building Co., Inc., Cupertino, California.

Space provided: motel office, restaurant, guest lounge, two conference rooms, two executive suites, manager's apartment. *Structural framing:* glulam floor beams spaced at 8′ and 12′-6″, resting upon glulam columns; glulam peaked and cambered roof beams spaced at 8′. *Exterior walls:* Palos Verdes stone, Texture One-Eleven plywood, stucco. *Interior walls:* wood paneling, gypsum board. *Floors:* carpeting over concrete on ground floor; carpeting over Tim-Deck on mezzanine floor. *Roof:* felt and tar over Tim-Deck and rigid insulation. *Heating:* gas-fired forced air. *Lighting:* incandescent. *Area:* 7,309 square feet. *Cost:* $11.63 a square foot.





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(Continued from page 64)

▲ **N. J., Ramsey**—SCHOOL—Bd. Educ. Ramsey Boro, project and bonds to be resubmitted Dec. 14, 22-room school off North Central Ave. **$1,571,400.** Epple & Seaman, 901 Broad St., Newark, archts. CD 5/20.

▲ **N. M., Albuquerque**—CITY HALL—City, City Hall, plans by James Liberty, 1100 Hermosa Dr. S.E., 7 story, bsmnt., concrete, brick and aluminum city hall. **$1,700,000.**

▲ **N. C., Boone**—HEALTH and PHYSICAL EDUCATION, etc.—Appalachian State Teachers College, health and physical education bldg., **$852,000;** power plant, boiler, steam lines, **$123,000;** classrooms, **$723,000;** underground sewage culvert, **$180,000;** student center and cafeteria, **$1,535,000.**

▲ **O., Ashtabula**—SCHOOL—Buckeye Bd. Educ., plans by Fulton, DelaMotte, Larson & Nassau, 6014 Euclid Ave., Cleveland, Zone 3, high school. **$2,850,000.** CD 5/11, under Edgewood Bd. Educ., as owner.

▲ **Pa., Franklin**—SCHOOL—Franklin Area Jt. School Dist., Box 350, secondary school, Proj. 851, **$3,000,000.**

▲ **Pa., Phila.**—SOCIAL SCIENCE CENTER—General State Authority, 18th and Herr Sts., Harrisburg, plans by Harbeson, Hough, Livingston & Larson, Architects Bldg., 4 story, Social Science Center, Phase I, for University of Pennsylvania, **$4,000,000.** CD 9/21.

▲ **Pa., University Park**—ARTS and HUMANITIES, etc.—General State Authority, 18th and Herr Sts., Harrisburg, plans by Eshbach, Pullinger, Stevens & Bruder, 1519 Walnut St., Phila., 4 story, rein.-con., steel Arts and Humanities Bldg., Proj. 800-34, **$3,500,000;** CD 11/2/59; plans by Thalheimer & Weitz, 1315 Walnut St., Phila., 4 story south wind addn. to Physical Education Bldg., Proj. 800-32, **$2,750,000;** CD 11/12/59, plans by Thalheimer & Weitz, 1315 Walnut St., Phila., 2 story, bsmnt. addn. to Electrical Engineering Bldg., Proj. 800-33, **$1,000,000,** above work for Pennsylvania State University.

▲† **Tenn., Oak Ridge**—EXPERIMENTAL REACTOR—Atomic Energy Comn., Oak Ridge, molten salt type experimental reactor, at Oak Ridge National Laboratory, **$4,100,000.** Burns & Roe, 160 W. Broadway, New York, N. Y., consult. engrs.

▲ **Wis., Milwaukee**—HIGH SCHOOL—School Bd., 1111 N. 10 St., plans by Grassold-Johnson & Assocs., 734 N. Jefferson St., Samuel Morse Junior High School. **$2,250,000.** CD 4/8/57.

COMMERCIAL BUILDINGS

▲ **Conn., East Lyme**—HOUSES—Lifetimes Homes, Inc., 523 Boston Post Rd., 114 houses, Carriage Hill. **$1,767,000.**

▲ **D. C., Wash.**—REGIONAL HEADQUARTERS OFFICE—Mutual of Omaha, Ring Bldg., plans by Vlastimil Koubek, 810 18th St. N. W., regional headquarters office, Connecticut and "R" St. N. W., **$3,000,000.**

▲ **Hawaii, Honolulu**—OFFICE—Alakea Parking Center, 1119 Alakea St., plans by Laucomer Assocs., Rm. 577, Alexander Young Bldg., 5 story L-shaped extension office. **$2,000,000.**

▲ **Ill., Urbana**—SHOPPING CENTER—T. J. Strong, T. J. Strong & Assocs., 512 Colorado Ave., plans by T. J. Strong & Assocs., 512 Colorado Ave., shopping center Sunnycrest Subdivision, **$2,000,000.** Bids in Spring 1961. CD 11/13/58.

▲ **Mich., Detroit**—MOTEL—Mansion Hotels, Inc., c/o Detroit Leland Hotel Co., Cass and Bagley Aves., Zone 26, 150 unit motel, underground parking, heliport, etc. First and Bagley Sts. **$2,000,000.** Bids in about 6 months.

▲ **N. J., Hopatcong**—HOUSES—Renato Belli, 18 Chestnut Ridge Rd., Saddle Brook. 200 houses, West Shore Lake Hopatcong. **$6,000,000.**

▲ **N. Y., Flushing**—APARTMENTS, etc.—Beechcroft Towers, c/o Jonathan Woodner Co., 575 Madison Ave., New York 22, N. Y., plans by Paul & Jarmul, 89-51 164 St., Jamaica, six 15 story apartments and shopping center, 16 acre plot, Kissena Blvd. between Franklin and Elder Aves. **$25,000,000.** Charles Wurmfeld, 150 Nassau St., New York 38, N. Y., mechanical engr. Abrahams, Hertzberg & Cantor, 207 E. 37 St., New York 16, N. Y., structural engrs. CD 11/2.

▲ **N. Y., Garden City**—DEPARTMENT STORE—Saks Fifth Ave., 5 Ave. and E. 49 St., New York, Zone 22, plans by Welton Becket & Assocs., 116 E. 55 St., New York, Zone 22, 100,000" sq. ft. department store, Franklin Ave. between 13 and 14 Sts. **$2,250,000.**

▲ **N. Y., New York**—SPORTS ARENA, etc.—New York Sports Entertainment Center, c/o Graham-Paige Corp., 401 Park Ave., plans by Charles L. Luckman Assocs., archts.-engrs., 680 5 Ave., 120 x 240 ft. Madison Square Garden sports arena, auxiliary arena, restaurant bldg., theatre, swimming pool, skating rink, parking, west side Manhattan. Site not selected. **$38,000,000.**

▲ **N. Y., New York**—APARTMENT—402 E. 77 St., Corp., 17 John St., plans by Tabor & Horowitz, 443 Park Ave. South, 18 story, 55x176 ft. apartment, 1476-1478 First Ave. **$2,100,000.**

▲ **N. Y., New York**—APARTMENT—Sulzberger Co., Inc., c/o Philip Birnbaum, 12 E. 48 St., New York, N. Y., plans by Slingerland & Booss, archts and mechanical engrs, 120 Greenwich St., Zone 6, 19 story apartment, 3 Ave. and East 16 St. **$3,000,000.** Biltmarr & Tischler, 101 Park Ave. Zone 17, structural engrs.

▲ **O., Mayfield Heights**—HOMES—C. L. Royan Co., 13494 Cedar Rd., Cleveland, Zone 18, 100 Homes, off SOM Center Rd. **$2,500,000.**

▲ **O., Northfield**—APARTMENTS—Glaser-Marotta Co.,

20515 Shaker Blvd., Cleveland, Zone 22, eighteen apartments, Northfield Sq. Proj. $3,000,000.

▲ **Tex., Dallas**—CONSUMERS MART—Consumers Mart, Jerry E. Young & Jim Costello, c/o 130 Casa Linda Plaza, Dallas, plans by John A. Parnell, 130 Casa Linda Plaza, consumers mart, 3200 Blk. Buckner Blvd. $2,500,000. CD 11/2.

▲ **Tex., Dallas**—STORES—NOM Corporation, T. W. Mobberley, pres., 10618 Royal Springs St., 75 masonry stores, North Central Expressway, between Valley View & Forest Lane, $2,000,000.

▲ **Tex., Houston**—OFFICE, etc.—Tanglewood Corp., 1661 Tanglewood St., 10 story, office and shopping, area of Westheimer and Post Oak Rds. $4,750,000. Constr. 1961.

▲ **Va., Richmond**—WAREHOUSES and OFFICES—Consolidated Sales Co., 2020 W. Broad St., plans by Marcellus Wright & Son, 100 E. Main St., 3 warehouses and offices, Staples Mill Rd., $2,200,000; warehouse and offices, Laburnum, $600,000. CD 10/28.

▲ **Wash., Seattle**—DORMITORY—Seattle University, Broadway and Madison St., plans by J. W. Maloney, Central Bldg., 8 story, bsmnt, dormitory for men, $2,690,000. Bids in Spring, CD 7/12.

▲ **Wis., Marshfield**—HOSPITAL—St. Joseph's Hospital plans by Hills, Gilbertson & Fisher, 6009 Wayzata Blvd., Minneapolis, Minn., two 6 story wings, 170-bed hospital addn. $3,500,000. Orr-Schelen, Inc., 1104 Currie Ave., Minneapolis, Minn., engr. CD 5/12.

▲ **Man., Winnipeg**—OFFICE—Allan T. Bass Ltd., 260-428 Portage Ave., plans by Libling, Michener & Assocs., 138 Portage Ave. E., 9 story office, Portage Ave., $3,000,000. CD 10/26.

▲ **Ont., London**—SHIPPING CENTRE—Sifton Constr. Co., 1215 Oxford St. W., shopping centre, Oakridge Park Subdivision, $1,750,000. CD 3/24.

▲ **Ont., Ottawa**—TELEPHONE—Bell Telephone Co. of Canada, 1050 Beaver Hall Hill, Montreal, Que., 5 story telephone bldg. addn. $2,500,000.

▲ **Ont., Owen Sound**—SHOPPING PLAZA—Owner, c/o Derby Twp., Twp. Clerk, Tara, shopping plaza, $1,500,000.

▲ **Ont., Toronto**—OFFICE—International Business Machines Co., Ltd., Don Mills Rd., plans by Clare G. MacLean, 534A Lawrence Ave., W., 8 story, 64,000 sq. ft. steel, glass, aluminum office, 2 story underground parking, King St. E., $1,500,000.

INDUSTRIAL BUILDINGS

▲ **Ala., Cherokee**—CHEMICAL PLANT, etc.—Armour & Co., 1425 W. 42nd St., Chicago, Ill., fertilizer and chemical mfg. plant. $30,000,000. Paxton & Alexander, 303 Raleigh Ave., Sheffield, consult. engrs. CD 10/21.

▲ **Kan., Bushton**—PLANT—Northern Gas Products Co. subsidiary Northern Natural Gas Co., 223 Dodge St., Omaha, Nev., propane extraction plant capable of processing 900 million cu. ft. natural gas per day and liquid salt cavern storage. Over $9,000,000. Filed application with Federal Power Commission.

▲ **Nev., Reno**—STEAM POWER PLANT—Sierra Pacific Power Co., 220 S. Virginia St., Reno, 66,000 kw. Frank A. Tracy steam power plant. To go ahead 1963-1964.

▲ **N. J., Flemington**—WAREHOUSE—L & C Mayers, 516 W. 34 St., New York, N. Y., will not construct warehouse, Reaville Rd. $2,000,000. Project abandoned. CD 2/1.

▲ **N. Y., Canandaigua**—PLANT—General Foods Corp., Birds Eye Div., 250 North St., White Plains, 180,000 sq. ft. processing and refrigeration plant. Over $2,000,000. Austin Co., 600 5 Ave., New York 20, N. Y., engr. Constr. Spring 1961. CD 3/4.

▲ **Tex., Lone Star**—MILLS, etc.—Lone Star Steel Co., Lone Star, spiral weld pipe mill unit, $1,500,000; remodeling rod mill, $1,000,000; remodeling plant, $750,000; stretch reducing mill, $1,000,000. CD 1/31/56.

▲ **Utah, Moab**—PROCESSING PLANT, etc.—Texas Gulf Sulphur Co., 75 E. 45 St., New York, N. Y., processing plant, potash mining, Cane Creek, 2,700 ft. mine shaft, aerial tramway, near here, Grand and San Juan Counties. $22,500,000. Constr. soon.

▲ **Alta., Pincher Creek**—PLANT—Shell Oil Co. of Canada Ltd., 505 University Ave., Toronto, Ont., 100,000,000 cu. ft. processed gas producing and sulphur mfg. plant, $20,000,000.

▲ **Man., Sprague**—PLANT—Columbia Hardbord Co., Skinner Bldg., Seattle, Wash., U. S. A., 50,000 sq. ft. particle-board mfg. plant, $3,000,000. Constr. this year.

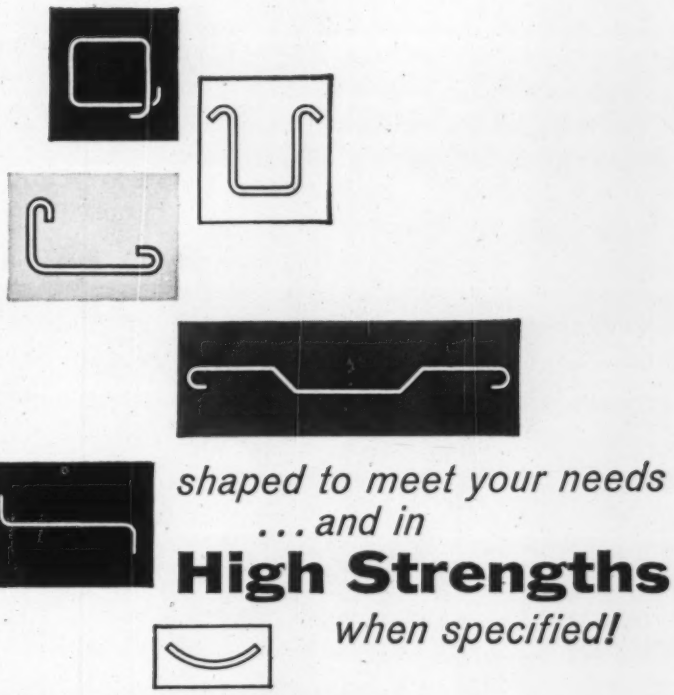
▲ **Que., Arvida**—PLANT—Aluminum Co. of Canada Ltd., Sun Life Bldg., Montreal, 6,000 to 8,000 tons aluminum producting experimental plant near Riviere Deschenes. $4,000,000.

FOREIGN

▲ **England, Hammersmith**—APARTMENTS, etc.—City Wall Properties, London, plans by Gollins, Melvin Ward & Partners, 15 Manchester Sq., London W. 1, England, Redevelopment Scheme, apartments, shops, showrooms, officers. $44,800,000.

▲ **Kuwait, Kuwait**—Govt. of Kuwait, Kuwait, sewerage sys. $1,730,000.

▲ **LEBANON**—Ministry P. Wks., Beirut, road building program, $20,000,000. Bids August 1961.



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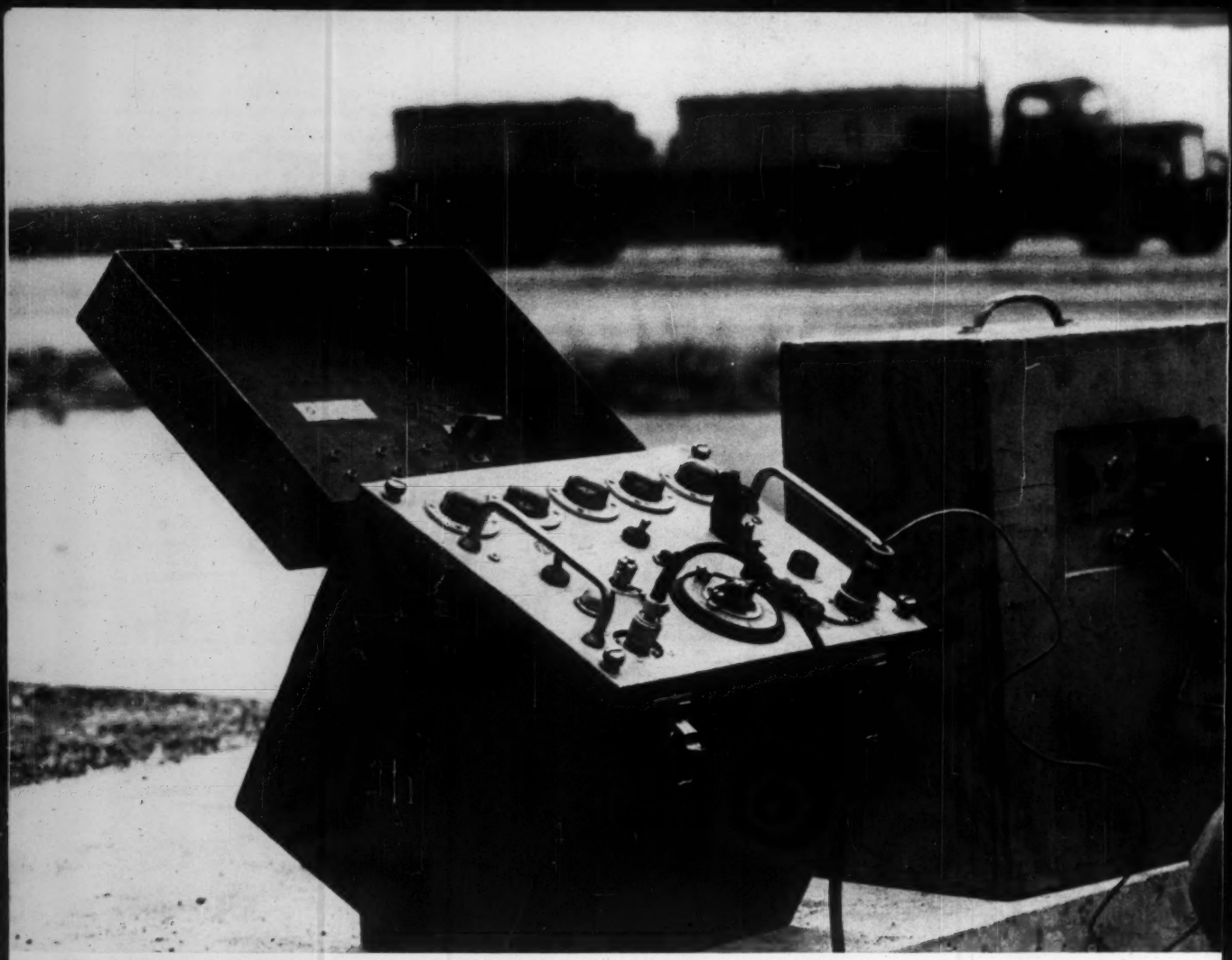

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Scientific readings by the ...recorded in the

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On November 30th traffic ends on five test loops at Ottawa, Illinois. 17 million miles of travel will have been marked up. Vital data have been pouring in, useful new facts on pavement performance are evident.

The entire National Road Test project is the most scientific experiment ever carried out on highway pavements. Modern statistical techniques for test section layout assure the total reliability and impartiality of findings. The newest in instrumentation, recording and automatic data processing equipment are providing a tremendous volume of data—free from human reading and transcription error.

Electronic computers, of course, play a major role in data analysis. Some 100 programs have been written for the computers—so complicated that as much as 2 weeks were needed to set up a single program.

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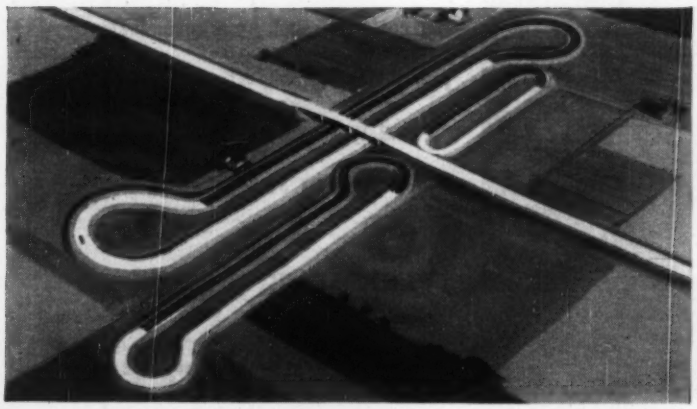

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NEW ENGLAND

BUILDINGS—BA

▲ **Mass., Boston**—RESEARCH BUILDINGS—BA 12/6—Harvard University, Bldg. & Grounds Dpt., 175 North Harvard St., Allston, Research Bldgs. 1 & 2, School of Public Health, Harvard University. $2,000,000. Extended date. Voorhees, Walker, Smith, Smith & Haines, 101 Park Ave., New York, N. Y., archts. Sasaki, Walker & Assoc., Inc., 133 Mt. Auburn St., Watertown, landscape archt.-site planner. CD 11/4.

BUILDINGS—LB & CA

▲ **Green Manor Constr. Co., Inc.,** 382 West Middle Turnpike, Manchester, Conn., CA **$1,556,575,** general contract Howell Cheney REGIONAL TECHNICAL SCHOOL, Hilliard St., Proj. BI-R-176, MANCHESTER, CONN. State P. Wks. Comr., 165 Capitol Ave., Hartford, Conn. Bids Oct. 13. CD 10/18, under LB.

▲ **Bonvicini Building Co., Inc.,** 1500 South Main St., Torrington, Conn., CA **$1,721,180,** Sunny Valley HIGH SCHOOL, NEW MILFORD, CONN. Town, Town Hall, New Milford, Conn. Bids Oct. 18. CD 10/21.

MIDDLE ATLANTIC

HEAVY CONSTRUCTION—BA

▲† **New York**—Ba 11/30—U. S. Eng., 111 East 16 St., New York 3, N. Y., dredging Schodack Creek, tributary of Hudson River which is about 15 mi. south of Albany, Columbia Co., CIVENG 30-075-61-13. $2,000,000. Plans deposit $2. CD 9/21.

▲ **N. Y., New York**—SUPERSTRUCTURE OF PIER—BA 12/20—Comr. Marine & Aviation, Rm. 304, Battery Maritime Bldg., foot of Whitehall St. (South Ferry), New York 4, Contr. No. 3060 for constr. of superstructure, general constr., plumbing work, heating, ventilating and air-conditioning; sprinkler, electrical elevator work, of New Pier 40 between Canal and Morton Sts., North River, Manhattan Boro. Plans deposit $20. CD 8/15/55.

▲† **N. J., Wrightstown**—LAUNCHER SHELTERS, etc.—BA 12/20—U. S. Eng., 111 East 16th St., New York 3, N. Y., 28 bomarc launcher shelters, composite bldg., A & M Bldg., addn. to SOC-TELCO facility, storage room addn., modification to heat and power bldg., constr. MOGAS facility and support facilities, McGuire Air Force Base, ENG-30-075-61-69. $2,000,000. CD 9/16.

BUILDINGS—BA

▲ **Md., Baltimore**—HIGH SCHOOL—BA 11/29—Catholic Diocese of Baltimore, 408 N. Charles St., Zone 1 (selected list bidders), Catholic High School, Caton and Wilkens Aves. $2,000,000. Mall, Ritter & Sprinkle, 4804 Roland Ave., Zone 10, archts.

▲ **N. Y., New York**—OFFICE ADDN.—BA 12/9—New York Telephone Co., 140 West St., Zone 7, 6 story, 60,000 sq. ft. E. 56 St. office addn. between 2 and 3 Aves. $2,500,000. Extended date. Voorhees, Walker, Smith, Smith & Haines, 101 Park Ave., Zone 17, archts. CD 9/22.

▲ **N. Y., Binghamton**—HOSPITAL ADDN.—BA 12/14—City, Bd. Contract & Supply, City Hall, hospital addn., Park Ave. $2,900,000. Plans deposit $50. Donald Ritchie, 134 Clarendon St., Boston, Mass., archt. CD 10/19.

▲ **Md., Wheaton**—HOSPITAL—BA 1/11—Sisters of the Holy Cross, Eastern Ave. and Bunker Hill Rd. N.E., Wash., D. C. (selected list bidders), hospital, Forest Glen Rd. and Georgia Ave. $3,000,000. Faulkner, Kingsbury & Stenhouse, Ring Bldg., Wash., D. C., archts. CD 3/13/59.

HEAVY CONSTRUCTION—LB & CA

NEW YORK—State Dpt. P. Wks., State Office Bldg., Albany, Bids opened 11/17,

N. Y.—**Bero Const. Corp.,** Box 70, River Rd., Waterloo, N. Y., LB **$2,246,869.50,** est. $2,625,000 (4 bidders), b. conc. Type 2A, 3.94 mi., misc. work 0.04 mi. City of Buffalo: Kensington Expressway Art. Hy. Sect. 1, Contr. III (East Tupper St. to East Utica St.), C 60-2, Erie Co.;

N. Y.—**D. W. Winkelman Co., Inc.,** 300 Long Branch Rd., Syracuse 9, N. Y., LB **$8,072,591.50,** est. $10,145,000 (11 bidders), b. conc. Type 2, 4.37 mi., 6.54 mi. acc. 3H G.S. Comp. I-beam, 4 spans 222.55 ft., 4 spans, 227 ft. total, 3 spans 159.91 ft. total, 1 bridge comp. I-beam 2 spans, 124.56 ft. total, 2 RRGS comp. I-beam, 1 span 96.75 ft., 3 spans 246.84 ft. total, viaduct comp. I-beam 19 sp. 1260, 5 ft. total, City of Utica-North South Art. Hy. (South City Line to Oriskany St. West) Seneca Turnpike-Utica Co. City Line Rte. 5 & 12, FAC 60-25, FAS H 60-12, Proj. U-UG 752(8), U-752(8), Oneida Co. CD 10/18.

▲ **NEW YORK**—State Hy. Dpt., State Office Bldg., Albany,

Lizza & Sons, Inc., 152 South St., Oyster Bay, N. Y., CA **$2,656,814,** 9 in. cem. conc. pavt. 2.67 mi. H.G.S. comp. WF beam 4 span 226.6 ft. total, H.G.S. double struct. comp. WF beam 3 span, 128.4 ft. total, Long Island Expressway, Contr. II (Deer Park Ave. to Commack Rd.) FALIE 60-3. Proj. U-862 (28), Suffolk Co. Bids Oct. 20, awarded Nov. 15. CD 10/21, under LB.

▲ **NEW YORK**—State Hy. Dpt., State Office Bldg., Albany,

N. Y.—**Slattery Contg. Co., Inc.,** 46-36 54 Rd., Maspeth, N. Y., CA **$8,809,153,** 9 in. cem. conc. pavt. 0.53 mi. H.G.S. comp. gird. 2 span 224.8 ft. total, etc. Interstate Rte. Conn. 511 Cross Bronx Expressway Contr. 4 (Plimpton Ave. to Walton Ave.) Rte. 95, FICBE 60-4. Proj. EI-95-1(44)2, Bronx Co.;

N. Y.—**Poirier & & McLane Corp.,** 33 W. 42 St., New York 36, N. Y., CA **$5,226,988,** 9 in. cem. conc. pavt. 0.98 mi. H.G.S. pl. gird. comp. I-beam 2 span 131 ft. total, viaduct comp. I-beam 8 span 595 ft. total viaduct steel beam 9 sp. 445.8 ft. total 2 ped. ramps, comp. I-beams, 8 sp. 534 ft. total Int. Rte. Conn. 517 Arthur V. Sheridan Expressway, Contr. 2 (Lowell St. to East Tremont Ave.) Rte. 278. FIASE 60-1. Proj. EI-278-1(45), Bronx Co.;

N. Y.—**Mount Vernon Constr. Corp.,** 22 W. First St., Mt. Vernon, N. Y., CA **$3,568,666,** 9 in. cem. conc. pavt. 4.65 mi. H.G.S. comp. I-beam 4 span 188.4 ft. total, H.G.S. rigid frame 1 span 40.4 ft. bridge comp I beam 2 span 110.7 ft. total, Bedford-Goldens Bridge, SH 5298A, Goldens Bridge-Purdy-Croton Falls, SH 5464 Peekskill-Salem Center. Pt. 2, SH 252. Rte. 22, R. C. 60-168, Westchester Co. Bids Oct. 20, awarded Nov. 15. Grand total $17,604,807. CD 10/21, under LB.

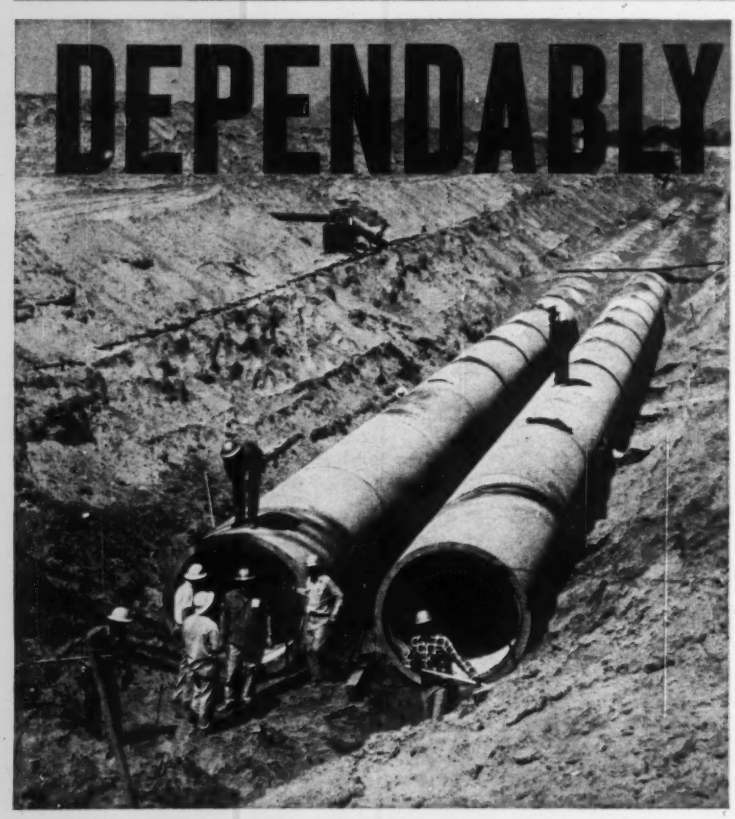
▲ **Westinghouse Air Brake Co.,** 350 5 Ave., New York 1, N. Y., CA **$7,688,171,** furnishing, installing block signaling and interlocking equip. for rehabilitation Lexington Ave. Line, IRT Div., Atlantic Ave. to Wall St., Contr. S-100, Brooklyn and Manhattan Boros, NEW YORK. New York City Transit Auth., 370 Jay St., Brooklyn 1, N. Y. Bids Sept. 23. CD 9/27, under LB.

▲ **Nassau Constr. Co.,** 155 St. and Harlem River Dr., New York 32, N. Y., CA **$1,900,102,** Contr. 809, reconstr. 155 St. Viaduct, Edgecombe Ave. to Macombs Pl., Manhattan Boro, NEW YORK, N. Y. President Manhattan Boro, Rm. 2034, Municipal Bldg., New York 7, N. Y. Bids Oct. 20, awarded Nov. 16. CD 11/11, under LB.

▲ **Slattery Contg. Corp.,** 46-36 54 Rd., Maspeth, N. Y., CA **$8,408,790,** Contr. 3, abutments, towers and approaches at Broadway Bridge over Harlem River Ship Canal, Manhattan Boro, NEW YORK, N. Y. Dpt. P. Wks., Rm. 1800-L, Municipal Bldg., New York 7, N. Y. Bids Oct. 19. CD 11/11, under LB.

▲ **NEW JERSEY**—State Hy. Dpt., 1035 Parkway Ave., Trenton,

Geo. M. Brewster & Son, Inc., 275 Fort Lee Rd., Bogota, N. J., CA **$7,897,320,** constr. 2.4 mi. Bergen-Passaic Expressway approaches to George Washington Bridge,



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Rtes. 80 and 95, Teaneck Rd. to Rte. 4, Bergen Co. Bids Nov. 3. CD 11/7, under LB.

▲ **NEW JERSEY**—State Hy. Dpt., 1035 Parkway Ave., Trenton,

Yonkers Contg. Co., Inc., 969 Midland Ave., Yonkers, N. Y., CA **$3,453,999,** grading and paving 3.104 mi. Rte. 80, Sect. 1B and 2L, from Rte. 46 to Landing Rd. interchange, Morris Co. Bids Oct. 13, awarded Nov. 14. CD 10/18, under LB.

▲ **Blount Bros. Constr. Co.,** 79 Commerce St., Montgomery, Ala., CA **$4,122,191,** Southwest Freeway Innerloop, Center Leg Connection, WASH., D. C. D. C. Govt., 499 Pennsylvania Ave. N.W., Wash., D. C. Gannett, Fleming, Corddry & Carpenter, 700 N. Front St., Harrisburg, Penn., archts. CD 11/3, under LB.

BUILDINGS—LB & CA

▲ **John W. Cowper Co.,** 1945 Sheridan Dr., Tonawanda, N. Y., LB **$6,906,044,** general contract PUBLIC LIBRARY, BUFFALO, N. Y. Bd. Supervs. Buffalo and Erie Co. Library Bd., Buffalo, N. Y. Bids Nov. 15. CD 10/10;
R. J. Moran & Sons, 361 DeWitt St., Buffalo, N. Y., LB **$889,200,** heating and ventilating Public Library (Buffalo, N. Y.);
Lang Electric Co., 273 Oak St., Buffalo, N. Y., LB **$767,000,** electric work Public Library (Buffalo, N. Y.);
Hamilton Mfg. Corp., Two Rivers, Wis., LB **$444,960** bookstacks, Public Library (Buffalo, N. Y.).

▲ **Samuel Bernstein & Sons and First Republic Assocs.,** 78-10 Parsons Blvd., Flushing 66, N. Y., Owner Builds, **$25,000,000,** 7 story OFFICE, 4 story APARTMENTS, Imperial Square, Fulton Ave. between Terrace and Hilton Aves., HEMPSTEAD, N. Y. Max M. Simon, 1841 Broadway, New York 23, N. Y., archts. CD 7/18.

▲ **Slattery Contg. Co., Inc.,** 46-36 45 Rd., Maspeth, N. Y., CA foundations POWER PLANT, LONG ISLAND CITY, N. Y. Consolidated Edison Co., 4 Irving Pl., New York 3, N. Y. CD 4/4;
American Bridge Div. U. S. Steel Corp., 71 Broadway, New York 6, N. Y., CA structural steel, Power Plant (Long Island City, N. Y.);
General Electric Co., 570 Lexington Ave., New York 22, N. Y., CA generating units, Power Plant (Long Island City, N. Y.);
Combustion Engineering, Inc., 200 Madison Ave., New York 16, N. Y., CA boilers, Power Plant (Long Island City, N. Y.);
Lindsay-Wright, Inc., 380 Lexington Ave., New York 17, N. Y., CA duct work, Power Plant (Long Island City, N. Y.).

▲ **Wilaka Constr. Co., Inc.,** 11 E. 44 St., New York 17, N. Y., LB **$1,811,000,** (3 bidders), general contract PUBLIC SCHOOL 199, W. 70 St. and West End Ave.; Manhattan Boro, NEW YORK, N. Y. Deputy Supt. Schools, Bureau Constr., 42-15 Crescent St., 4th Floor, Long Island City 1, N. Y. Bids Nov. 15. CD 10/24.

▲ **M. Melnick & Co., Inc.,** 225 Willow Ave., New York 54, N. Y., CA **$1,582,500,** general contract PUBLIC PARKING GARAGE, 82 Ave., 126 St., Union Turnpike and 132 St., Queens Boro, KEW GARDENS, N. Y. Dpt. P. Wks., Rm. 2200, Municipal Bldg., New York 7, N. Y. Bids Oct. 19, awarded Nov. 9. CD 10/25, under LB.

▲ **Terminal Constr. Corp.,** Rte. 17, Wood-Ridge, N. J., LB **$4,166,700,** (9 bidders), general contract NURSES' RESIDENCE and SCHOOL, Bronx Municipal Hospital Center, Bronx Boro, NEW YORK, N. Y. Dpt. P. Wks., Municipal Bldg., Rm. 2200, New York 7, N. Y. Bids Nov. 10. CD 10/14;
Louis Light Contractors, Inc., 96-11 222 St., Queens Village, N. Y., LB **$710,000,** (8 bidders), plumbing Nurses' Residence and School, Bronx Municipal Hospital Center, Bronx Boro (New York, N. Y.);
Raymar Contracting Corp., 31-15 14 St., Long Island City 6, N. Y., LB **$704,500,** (7 bidders), heating and ventilating Nurses' Residence and School, Bronx Municipal Hospital Center, Bronx Boro (New York, N. Y.);
A. I. Smith Electrical Contractors, Inc., 4601 Ave. N, Brooklyn 34, N. Y., LB **$585,850,** (10 bidders), electrical work Nurses' Residence and School, Bronx Municipal Hospital Center, Bronx Boro (New York, N. Y.).

▲ **Williamsburg Homes, Inc.,** 716 Federal St., Camden, N. J., Separate Contracts, **$12,000,000,** RESIDENTIAL DEVELOPMENT, Woodlane Rd., etc., BURLINGTON, N. J. Lester Weckesser, 16 Montana Ave., Erlton, N. J., archts.

▲ **Kramer, Yarosh & Pinella,** c/o Langton Co., 32 Kinderamack Rd., Oradell, N. J., Owner Builds, **$2,000,000,** 75 addnl. HOUSES in New Woodland Park, on Union Ave., Raritan Twp., HAZLET, N. J.

▲ **Major Developers Corp.,** c/o Gerber & Pancani, archts., 11 Commerce St., Newark, N. J., Owner Builds, **$2,500,000,** 100 HOUSES, off Rte. 9 and Throckmorton Lane, Madison Twp., MATAWAN, N. J.

▲ **Alexander Caplan, Inc.,** 5 Dorset Lane, Short Hills, N. J., Owner Builds, **$3,000,000,** 94 HOUSES, Hartshorne Rd., MIDDLETOWN, N. J. Walter Pfeiffer, 109 Washington St., Morristown, N. J., archt. CD 7/18.

▲ **Edward J. Walsh, Jr., Inc.,** 531 Woodland Ave., Springfield, Pa., Separate Contracts, **$4,000,000,** Dutton's Mill RESIDENTIAL DEVELOPMENT (260), BROOKHAVEN (BR. CHESTER), PA.

▲ **Kirby & McGuire,** 2518 Greenmount Ave., Baltimore 18, Md., CA **$2,000,000,** 4 story, bsmnt., steel frame, brick The Jefferson Bldg. OFFICE, 105 Chesapeake Ave., TOWSON, MD. Valley Green, Inc., c/o Bonnett & Brandt, archts., 701 Cathedral St., Baltimore 1, Md.

▲ **McCloskey & Co.,** 1620 West Thompson St., Phila., Pa., CA Est. **$4,500,000,** construct-lease POST OFFICE TERMINAL ANNEX, Chestnut, 30 and Walnut St., PHILA., PA. Post Office Dpt., Pennsylvania Ave., 12th and 13th Sts. N.W., Wash., D. C. CD 10/19, under LB.

▲ **Anthony P. Falcone,** 2330 Haverford Rd., Ardmore, Pa., Separate Contracts, **$2,000,000,** 162 unit APARTMENT, Lancaster Pike, ROSEMONT, PA. George S. Ideil, 117 S. 17th St., Phila., Pa., archt.

▲ **Baltimore Gas & Elec. Co.,** Lexington Bldg., Baltimore 3, Md., Owner Builds, **$5,125,800,** concrete steam electric generating POWER PLANT, near Chase, BALTIMORE, MD. CD 8/2/51.

▲ **John McShain, Inc.,** 1501 N. Arlington Ridge Rd., Arlington, Va., CA **$2,649,000,** BASIC SCIENCE AND RESEARCH BLDG., WASH., D. C. Thomas H. Locraft & Assocs., 1518 P St. N.W., Wash., D. C., archts. Bernard F. Locraft, 1179 New Hampshire Ave. N.W., Wash., D. C., engrs. CD 10/7, under LB.

SOUTH

HEAVY CONSTRUCTION—BA

▲ **Va., Norfolk**—BA 1/4—Dpt. P. Wks., City Hall, Western Branch Dam, Nasemond River. $3,000,000. CD 3/24.

BUILDINGS—BA

▲ **La., New Orleans**—MEDICAL SCHOOL ADDN.—BA 12/8—Tulane University, 6823 St. Charles Ave., 9 story, 270,000 sq. ft., rein.-con. structure, frame medical school addn., alterations to Hutchinson Memorial, Tulane Medical School. Mathes, Bergman & Assn., 929 Howard Ave., archts. Ellerbe & Co., 333 Sibley St. St. Paul, Minn., engrs. CD 4/22/58.

BUILDINGS—SLC

▲ **Fla., Jacksonville Beach**—APARTMENT—Island Development Corp., 929 N. 3rd St. soon lets contract 150,000 sq. ft. apartment. $1,500,000. Fred C. Van Dusen, 1028 Gray St., archt.

HEAVY CONSTRUCTION—LB & CA

▲ **R. P. Farnsworth & Co., Inc.,** Box 850, New Orleans, La., CA **$1,530,714,** Req. No. 4709, addnl. work, Nashville Ave. Wharf, NEW ORLEANS, LA. Port of New Orleans, No. 2 Canal St., New Orleans, La. Bids Nov. 2, awarded Nov. 7. CD 11/7, under LB.

▲ **KENTUCKY**—Commonwealth of Kentucky, Dpt. Hys., Frankfort,
Ky.—**W. L. Harper & Co.,** 1073 Emerson St., Park Hills, Covington, Ky., CA **$1,254,784,** c. conc. pavt. 4.045 mi. Covington-Lexington, I 75-7(10)169, Boone Co.; CA **$1,522,901,** c. conc. pavt. 5.41 mi. Covington-

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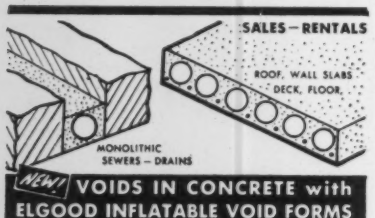

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Lexington, Proj. I 75-7(15)164, Boone, Grant and Kenton Counties;

Ky.—**George M. Eady Co.,** 340 Byrne St., Louisville, Ky., CA **$542,853,** grade, drain-high type surf. 2.89 mi. Paintsville-Prestonsburg, F 133(12), Johnson Co. Bids Nov. 4, awarded Nov. 9. Grand total $3,320,538. CD 11/9, under LB.

BUILDINGS—LB & CA

▲ **Trammell Constr. Co.,** Johnson City Rd., Bristol, Tenn., CA **$1,825,000,** 3 men's RESIDENCE HALLS, 2 women's RESIDENCES and DINING HALL, DANVILLE, KY. Centre College of Kentucky, Danville, Ky. Bids Sept. 21, awarded Nov. 14. CD 9/27, under LB.

MIDDLE WEST

▲ **O., South Euclid**—SCHOOL—BA 12/8—South Euclid-Lyndhurst Bd. Educ., 4777 Farnhurst Rd., Cleveland, Zone 24, Brush High School addn. $2,000,000. Plans deposit $50. Spahn & Barnes, 1950 Lee Rd., Cleveland, Zone 18, archts. CD 11/9/59.

▲ **O., Cleveland**—HOUSING—BA 12/13—Cleveland Metropolitan Housing Auth., 1325 W. 28th St., Zone 13, 272 unit low rental housing, Springbrook Apartments, Proj. OH 3-17A, Hough Ave. $3,000,000. Plans deposit $100. Shafer, Flynn & Williams, 1740 E 12th St., Zone 14, archts. CD 7/31/58.

HEAVY CONSTRUCTION—LB & CA

▲ **Ryan Constr. Co.,** 800 E. Michigan St., Evansville, Ind. CA Approx. **$1,700,000,** WW imprvs., mains, pumping stations, EVANSVILLE, IND. City, City Hall, Evansville, Ind. Bids Oct. 24. CD 10/5.

BUILDINGS—LB & CA

▲ **Dunlap & Co., Inc.,** 522 Jackson St., Columbus, Ind. CA 10,600 sq. ft. steel, concrete engine assembly PLANT, COLUMBUS, IND. Cummings Engine Co., Inc., 5th and California Sts., Columbus, Ind. Total est. **$1,700,000;**
Indiana Bridge Co., Inc., 1810 S. Macedonia St., Muncie, Ind., CA, structural steel contract for PLANT, (Columbus, Ind.);
Hatfield Electric Co., Inc., 1348 W. 16th St., Indianapolis, Ind., CA electrical contract for PLANT (Columbus, Ind.).

▲ **Girdler Engineering Corp.,** Box 174, Louisville, Ky., CA **$15,000,000,** design and construct CHEMICAL PLANT, tank farms, road, waste basin, PEORIA, ILL. Archer-Daniels-Midland Co., Investors Bldg., Minneapolis, Minn. CD 6/22.

MISSISSIPPI TO ROCKIES

BUILDINGS—BA

▲ **Kan., Kansas City**—HOUSING—BA 11/29—City Housing Auth., 619 Ann St., Juniper Gardens Housing Proj. $4,500,000. Plans deposit $50. Mullin & Hansen, 1401 Fairfax Trafficway, Kansas City, Kan., archts. CD 9/24/59.

▲ **Tex., Austin**—LIBRARY and ACADEMIC CENTER—BA 12/1—University Texas, Main Administration Bldg., undergraduate Library and Academic Center. Approx. $2,000,000. Plans deposit $50. Jessen, Jessen, Millhouse & Greeven, 2816 Hemphill Park, Austin, and George L. Dahl, 2101 N. St., St. Paul St., Dallas, archts. George L. Dahl, 2101 N. St. Paul St., Dallas, engr. CD 11/10/22.

▲ **Okla., Ponca City**—RESEARCH LABORATORY—BA 12/6—Continental Oil Co., Ponca City, research laboratory addn., laboratory service addn. $1,800,000. CD 7/13.

▲† **Mo., Fort Leonard Wood**—EM BARRACKS, etc.—BA About 12/22—U. S. Eng., 1800 Federal Office Bldg., Kansas City 6, Mo., Second Increment of First Regimental Area, First Battalion Facilities to incl. two 2 company EM barracks, 40,600 sq. ft. each, consolidated mess, administrative and storage bldg. and site imprvs., ENG-23-028-61-39. $2,000,000. Plans deposit $10. CD 7/22.

HEAVY CONSTRUCTION—LB & CA

▲ **IOWA**—State Hy. Comn., Ames, Bids opened 11/15,
Iowa—**Cameron, Joyce & Co.,** 19 S. 7th St., Keokuk, Iowa, LB **$2,059,692,** c. conc. 7.351 mi. Proj. I 29-6(7)114, Monona Co.; LB **$210,252,** c. conc. 1.873 mi. Proj. Special F 993(1), Monona Co.; LB **$1,949,946,** c. conc. 6.684 mi. I 29-6(8)122, Monona and Woodbury Counties;
Iowa—**Hallett Constr. Co.,** Boone, Iowa, and Crosby, Minn., LB **$433,744,** b. conc. 4.747 mi. Proj. F 408(12), Cass Co. CD 11/2.

▲ **ARKANSAS**—State Hy. Comn., State Capitol, Little Rock.
Ark.—**Foster & Creighton Co.,** American National Bank Bldg., Nashville, Tenn., CA **$3,066,070,** construction Freeway between East Capitol Ave. and South Terminal Interchange in Little Rock, Pulaski Co., CD 11/14, under LB;
Ark.—**Ben M. Hogan Co.,** P. O. Box 2860, Little Rock, Ark., CA **$750,523,** reconstruction 7.87 mi. U. S. Hy. 67 between Diaz and Tuckerman, Jackson Co., CA **$614,146,** surfacing 6.68 mi. North Little Rock-Jacksonville section of new U. S. Hy. 67, route Pulaski Co., CA 11/15, under LB;
Ark.—**McGeorge Contg. Co.,** 104 Nebraska St., Pine Bluff, Ark., CA **$520,534,** surfacing 4.8 mi. U. S. Hy. 65 from Van Buren County line north, Searcy Co., CD 11/15, under LB. Bids Nov. 9.

▲† **J. A. Jones Constr. Co.,** 209 W. 4 St., Charlotte, N. C., and **T. L. James & Co., Inc.,** Airline Hy., Kenner, La., CA **$15,913,037,** Beaver Dam and Reservoir near Eureka Springs, White River, CIVENG-03-050-61-13, ARKANSAS. U. S. Eng., P.O. Box 867, Little Rock, Ark. Bids Nov. 3. CD 11/7, under LB.

▲† **J. A. Jones Constr. Co.,** 209 W. 4th St., Charlotte, N. C., and **Brown & Root, Inc.,** P.O. Box 3, Houston, Tex., LB **$17,461,918,** est. $18,491,833 (9 bidders), intake and power house substructure of Big Ben Dam, Fort Thompson, ENG-25-066-61-15, SOUTH DAKOTA. U. S. Eng., 1709 Jackson St., Omaha, Zone 2, Neb. Bids Nov. 15. CD 9/22.

FAR WEST

HEAVY CONSTRUCTION—LB & CA

▲ **Alcan Pacific Co.,** Box 1551, Anchorage, Alaska, LB **$1,572,000,** Base Bid, 8 m.g.d. water filtration plant, ANCHORAGE, ALASKA. City, City Hall, Anchorage, Alaska. Bids Nov. 10. CD 11/9.
Patti Macdonald Constr. Co., Box 71634, Anchorage, Alaska, LB **$1,585,636,** alternate bid, water filtration plant (Anchorage, Alaska).

▲ **CALIFORNIA**—State Div. Hys., 120 S. Spring St., Los Angeles, Bids opened 11/10,
Peter Kiewit Sons Co., 345 Kieways Ave., Arcadia, Calif., LB **$5,715,935,** (6 bidders), grading, paving and bridges, 8 lane freeway for 4.7 mi. between 0.7 mi. north of 208 St. and 0.4 mi. South Pacific Coast Hy. near Wilmington, Harbor Freeway, Los Angeles Co. CD 10/5.

▲ **City Council,** City Hall, 9 and I Sts., Sacramento, Calif. rejected bids Oct. 27, water treatment facilities, Sacramento River near 10 Ave. and Riverside Blvd., SACRAMENTO, CALIF. Will re-advertise. LB **$2,316,742.** CD 11/1, under LB.

▲ **Hawaiian Dredging & Constr. Co.,** 1350 Ala Moana Blvd., Honolulu, Hawaii, CA **$1,680,000** utilities, roads and paving, Honolulu International Airport, Job 5883-Stage 7, HONOLULU, HAWAII. Hawaii Aeronautics Comn., Honolulu International Airport Bldg., Honolulu, Hawaii Awarded Oct. 28. CD 3/10.

BUILDINGS—LB & CA

▲ **M. J. Kuney Co. & E. R. Haynes Co.,** Box 882 Spokane, Wash., CA **$3,900,000,** 3,500,000 bu. GRAIN ELEVATOR, 750 ft. shipping dock and barge, truck and rail unloading facilities, KALAMA, WASH. Port of Kalama, Box 7, Kalama, Wash. Bids Nov. 1. CD 11/4, under LB.

▲ **Louis Lesser Enterprises,** 8737 Wilshire Blvd., Beverly Hills, Calif., Owner Builds, **$1,750,000,** 70,000 sq. ft. rein.-con. OFFICE, Wilshire Blvd. and Arnaz Dr., BEVERLY HILLS, CALIF. Sidney Eisenshtat, 1145 S. Beverly Dr., Los Angeles, Calif., archt.

▲ **Guy Hall,** Box 1086, Bakersfield, Calif., LB **$3,570,000,** (5 bidders), MUNICIPAL AUDITORIUM, BAKERSFIELD, CALIF. City, City Hall, Bakersfield, Calif. Bids Nov. 14. CD 10/5.

▲ **Continental Constr. Co.,** 4671 24 St., Sacramento, Calif., CA **$2,251,000,** 197,000 sq. ft. DEPARTMENT STORE, Arden Fair Shopping Center, near SACRAMENTO, CALIF. Hales Dpt. Store, 9 and K Sts., Sacramento, Calif. CD 9/27, under LB.

▲ **Campbell Constr. Co.,** 800 R St., Sacramento, Calif., LB **$1,912,950,** (4 bidders), 1,000 student Fern Bacon JUNIOR HIGH SCHOOL, SACRAMENTO, CALIF. Sacramento City Unified School Dist., 1619 N St., Sacramento, Calif. Bids Nov. 14. CD 10/20.

▲ **Bob Long Constr. Co.,** P. O. Box 1624, Fresno, Calif., CA **$2,079,300,** 3 story, bsmnt., 75,000 sq. ft. rein.-con. St. Joseph's HOSPITAL addn., California and Walnut Sts., STOCKTON, CALIF. St. Joseph's Hospital, California and Walnut Sts., Stockton, Calif. Bids Sept. 7. CD 9/22, under LB.

CANADA

BUILDINGS—SLC

▲ **Ont., Weston**—HOSPITAL—Humber Memorial Hospital, 200 Church St., soon lets contract 4 story, 46x205 ft. steel frame hospital addn. $1,700,000. Plans deposit $50. Extended date. John B. Parkin Assocs., 1500 Don Mills Rd., Don Mills, archts. CD 10/20.

HEAVY CONSTRUCTION—LB & CA

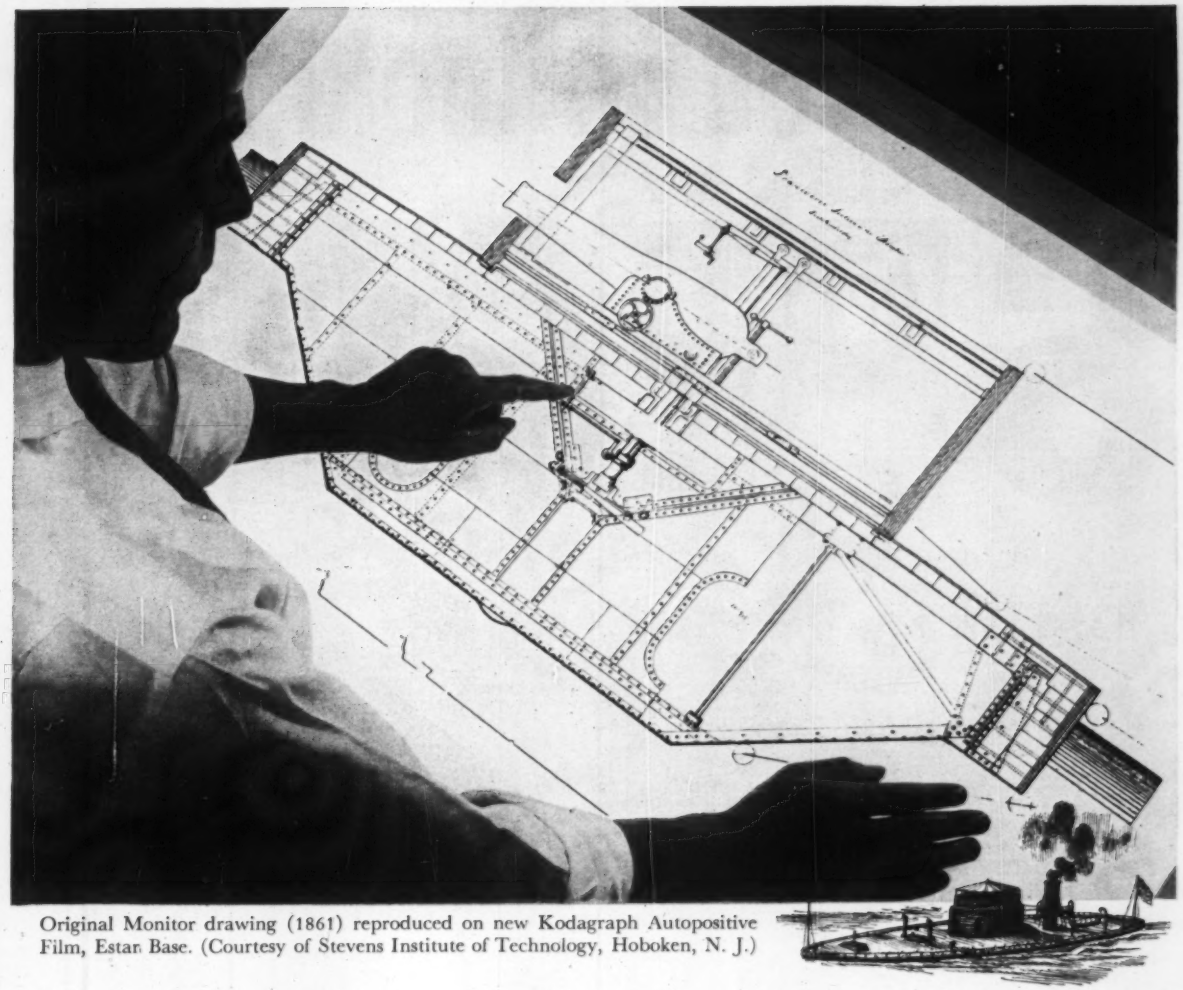
▲ **Keystone Contractors Ltd.,** 2490 McDougall St., Windsor, Ont., CA **$1,720,126,** (15 bidders), approx. 6,500 lin. ft. 9 in. monolithic sewer, 14,000 lin. ft. 18- to 72-in. sewers, Church St. relief sewer. WINDSOR, ONT. City, City Hall, Windsor, Ont. Bids Oct. 31. CD 10/13.

▲ **A. Janin & Co., Ltd.,** 7085 Cote des Neiges Rd., Montreal, Que., CA Est. **$5,000,000,** MISSILE BASE, incl. 640,000 ft. launching site, containing 28 launching huts, 36x60 ft. in four rows of seven, 1,000 x 2,000 ft. administration and domestic area, LA MACAZA, QUE. Defence Constr. (1951) Ltd., 56 Lyon St., Ottawa, Ont.

BUILDINGS—LB & CA

▲ **Anglin-Norcross Quebec Ltd.,** 892 Sherbrooke St. W., Montreal, Que., CA Est. **$2,500,000,** SHOPPING CENTRE, Junction of Hys. 3 and 4, CHATEAUGUAY, QUE. Chateauguay Regional Shopping Plaza, 550 Sherbrooke St. W., Montreal, Que. Greenspoon, Freedlander & Dunne, 4151 Sherbrooke St. W., Montreal, Que., archts. Backler & Horvath, 5253 Decarie Blvd., Montreal, Que., engrs.

(Proposal Advertisements see pp. 84 to 87)



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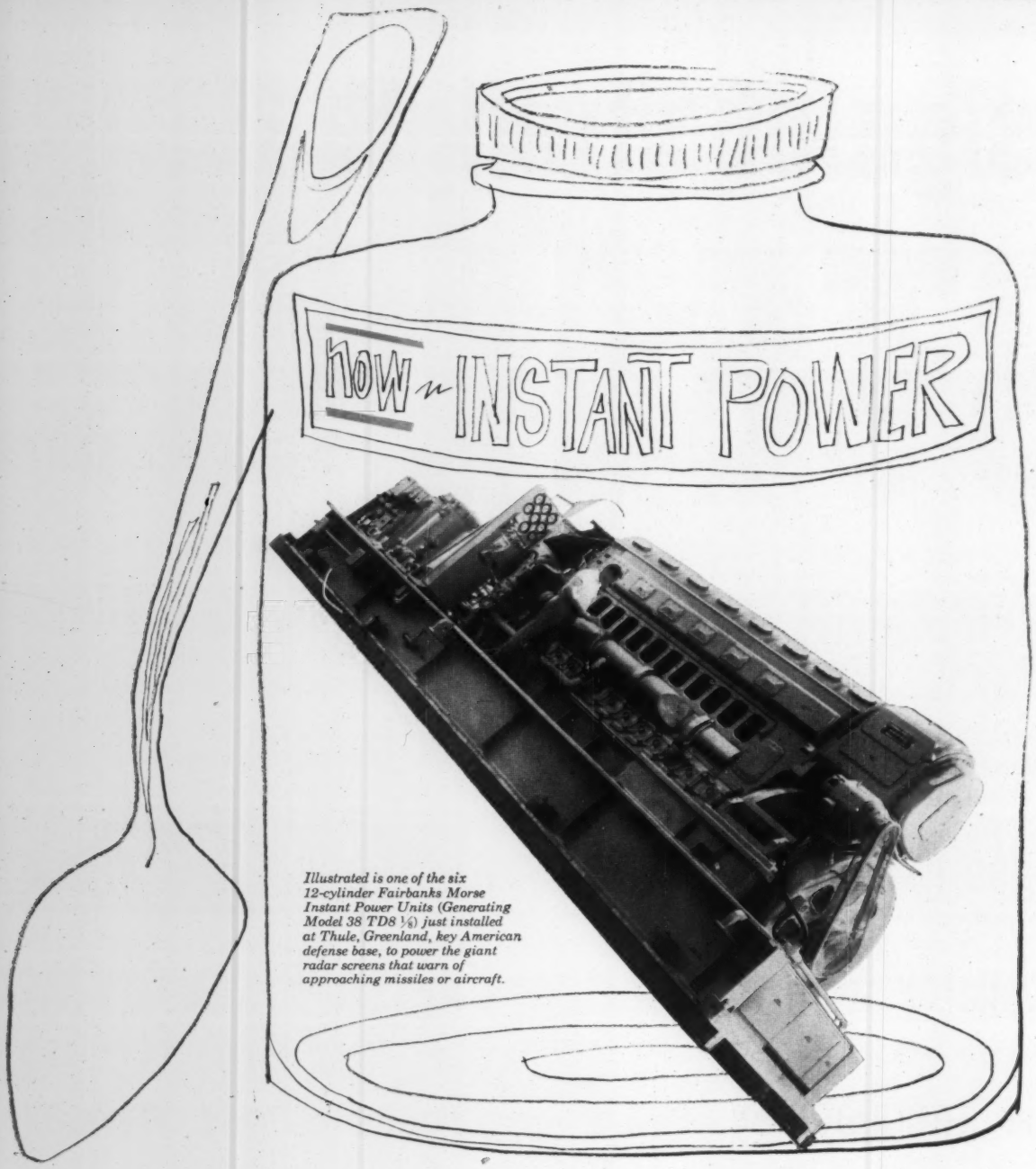

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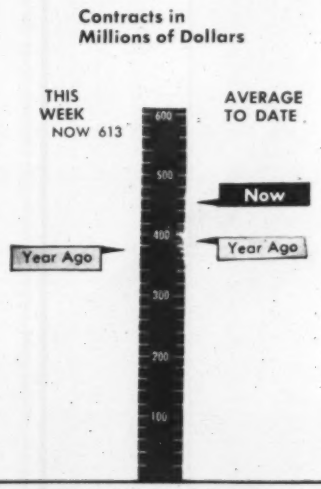
Construction Scoreboard

This Week . . .



AMOUNT OF CONTRACTS LET

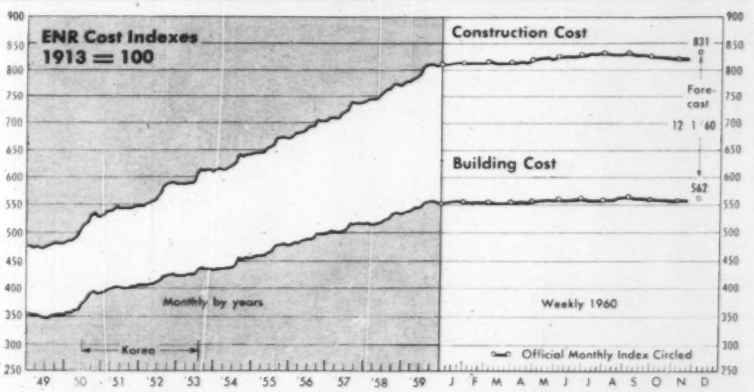
Contracts Awarded In 50 States By Type	This Week millions	Cum. 47 wks 1960	Chge '59-'60 %
All Heavy Construction	$613.4	$21,028.6	+14
By Ownership			
PRIVATE	365.3	11,318.0	+21
PUBLIC	248.1	9,710.6	+ 7
State & Muncipal	153.2	7,548.7	+16
Federal	94.9	2,161.9	−16
By Type of Work			
PUBLIC			
Waterworks	6.3	423.9	+20
Sewerage	10.5	544.9	− 8
Bridges*	17.4	740.3	+42
Highways	100.8	3,103.3	+18
Earthwork, Dams & Waterways	25.1	703.2	−12
Buildings:			
Excl. Housing	45.5	2,269.9	− 5
Housing	11.0	639.6	+12
Unclassified	32.7	1,294.3	+ 6
PRIVATE			
Buildings:			
Mass Housing	106.2	5,431.9	+29
Commercial	125.9	2,333.1	+20
Industrial	127.4	2,574.5	− 6
Unclassified	4.6	969.7	+110

*Includes Private bridges

NOTE Minimum size projects included are: Waterworks and waterways, $53,000; other public works, $88,000; industrial buildings, $110,000; other buildings, $400,000.

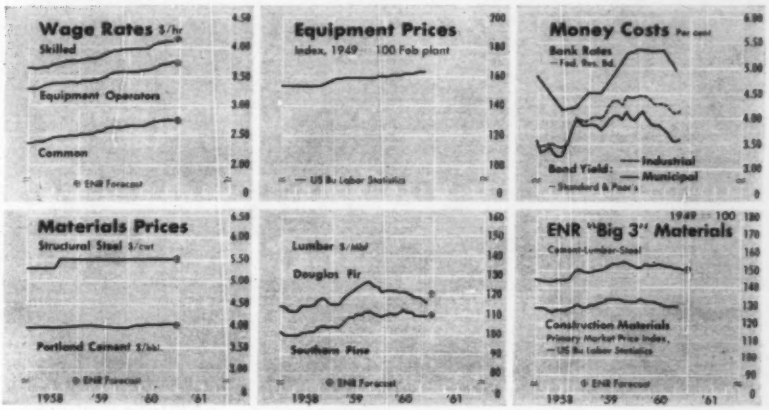
NEW CONSTRUCTION CAPITAL

	Week of Nov. 17 millions	Cum. 46 wks 1960	Chge '59-'60 %
Corporate Securities	$ 59.6	$3,381.7	− 1
State and Municipal:			
All Except Housing	183.5	5,746.0	+ 9
Housing	9.8	199.0	+85
Federal Loans	5.3	171.0	+32
Federal Aid	....	3,228.4	− 3
Total Nonfederal	$258.3	$12,726.2	+ 4
Federal Appropriations:			
Projects in U. S.	....	3,165.6	−11
Outside U. S.	....	159.1	+610
Total New Capital	$258.3	$16,051.0	+ 1



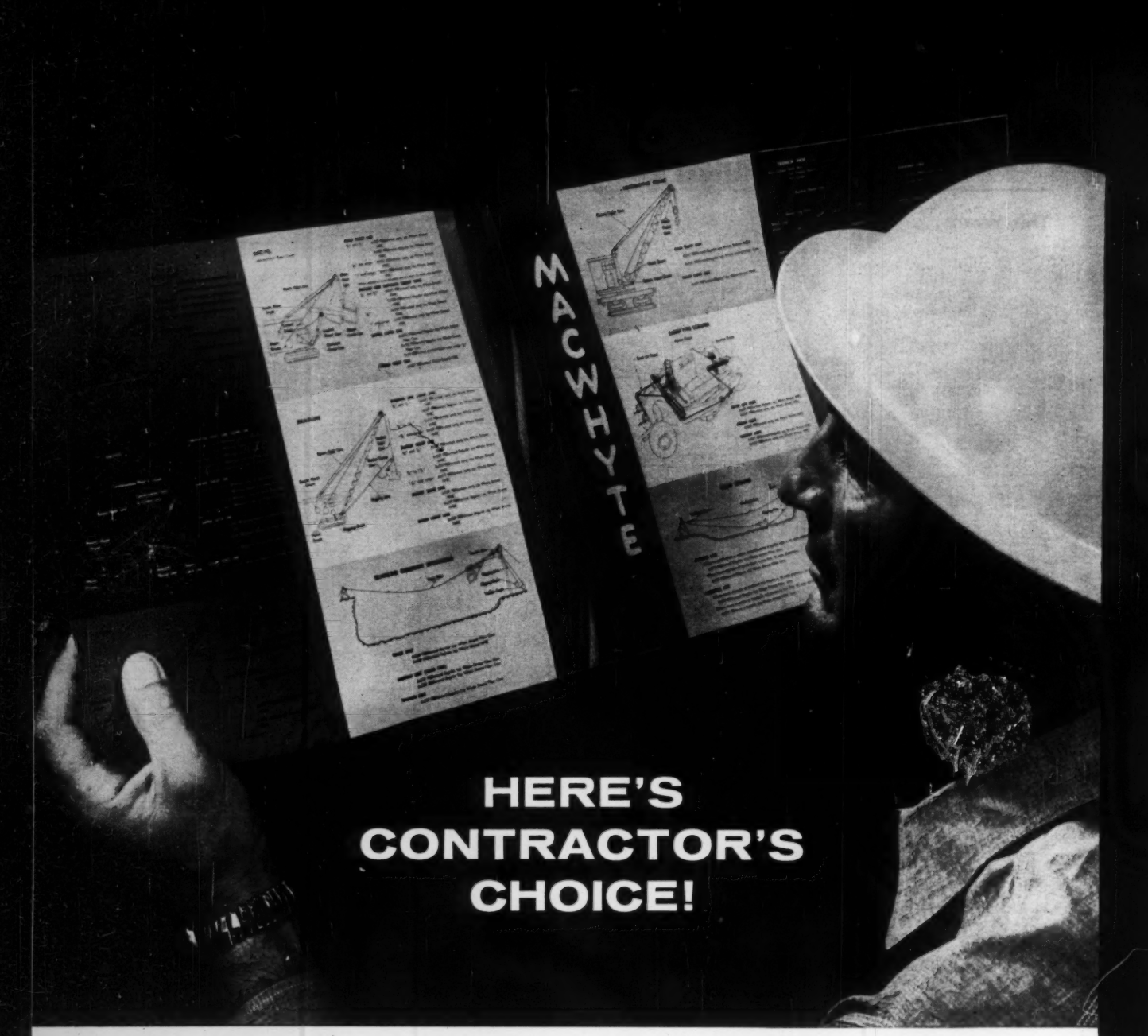
ENR INDEXES (1913=100), 20 cities' average	Week of Nov. 17 1960	% Change from Oct. 20 1960	% Change from Nov. 15 1959
Construction Cost	829.91	+0.08	+2.4
Building Cost	560.93	−0.03	+1.1

To convert above indexes to 1926 = 100: Divide Construction Cost by 2.080; Building Cost by 1.850.
1949 = 100: Divide Construction Cost by 4.770; Building Cost by 3.518.



ENR COST INDEXES IN 22 CITIES, 1913=100

City	Construction Cost Nov. 1960	Construction Cost Percent Change from last Month	Construction Cost Percent Change from last Year	Building Cost Nov. 1960	Building Cost Percent Change from last Month	Building Cost Percent Change from last Year
Atlanta	647.34	−0.3	+3.9	498.64	−0.3	−0.1
Baltimore	754.84	+0.01	+1.3	560.68	+0.02	+0.5
Birmingham	674.37	0	+3.4	525.80	0	+2.1
Boston	837.56	+0.5	+0.9	571.13	+0.8	+1.9
Chicago	914.36	−0.1	−0.6	589.42	−0.2	+1.1
Cincinnati	839.35	0	+3.0	545.13	0	+1.0
Cleveland	943.40	0	+2.5	560.55	0	+1.1
Dallas	639.06	0	+5.6	523.78	0	+6.8
Denver	756.22	0	+1.3	552.27	0	+1.4
Detroit	963.54	0	+0.3	605.32	0	+1.4
Kansas City	812.58	0	+1.8	553.13	0	+0.08
Los Angeles	900.59	−0.4	+3.3	561.09	−0.6	+0.7
Minneapolis	884.84	+0.01	+3.0	575.71	+0.02	+1.2
New Orleans	649.27	+1.6	+2.3	507.84	+0.2	+0.04
New York	1,036.28	+0.2	+2.5	645.90	−0.3	+0.04
Philadelphia	830.37	0	+5.0	589.74	+0.2	+2.1
Pittsburgh	885.14	0	+4.2	621.28	0	+3.5
St. Louis	900.56	+0.6	+2.7	576.47	−0.4	+0.06
San Francisco	877.37	0	+2.8	554.58	0	+0.3
Seattle	852.90	−0.3	+2.3	503.89	−0.4	+0.2
U. S.—20 Cities' avg.	**830.09**	**+0.06**	**+2.5**	**561.11**	**−0.06**	**+1.2**
Montreal	648.79	−0.2	+2.9	464.48	−0.3	+1.2
Toronto	689.98	0	+4.7	492.11	+0.5	+0.4



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Construction Spending to Rise in '61

Spending on new construction next year is expected to rise 4% above 1960 to a total of $57.3 billion. This would top 1959's record of $56.2 billion by 2% (see table). Estimate for 1960 is $55.1 billion.

The estimate for '60 and forecast for '61 were supplied last week by the Business and Defense Services Administration of the U.S. Department of Commerce.

ENR has forecast that heavy construction contract awards in 1961 will hit a new record, rising 3% above 1960 to a total of $23.4 billion (ENR Sept. 8, p. 21). Construction to be put in place next year will stem in part from contracts let this year—they are running 13% above one year ago.

Although dollar volume in 1961 will top that of 1959, the BDSA says the physical volume of construction put in place will be 2% below 1959, reflecting price changes in the two-year interval.

Public construction spending is expected to rise 5% and private construction 3%. Both categories will set a dollar record next year, the agency says.

Almost every type of construction is expected to equal or rise over 1960 levels, which are close to the 1959 record.

The outlook for new construction in 1961 is based on the assumption that the nation's total output of goods and services will remain at about 1960 levels. It also assumes that while the nation's economic pace in 1961 will not boost most construction categories significantly, the public area should benefit from higher spending by all levels of government. Construction costs may rise somewhat less than in 1960.

Pressure on credit, usually associated with a general expansion of business activity and a strong housing market, probably will not be as great next year as it was in 1959 and 1960. It therefore appears that funds to finance housing and other types of construction will be sufficient to support the outlays anticipated.

Approximately 1,350,000 new private and public housing units will be started in 1961, compared to about 1,300,000 in 1960. Included in the 1961 estimate are about 50,000 public housing units, 1% more than in 1960. New farm housing construction is expected to remain stable.

The forecast for private housing assumes a strong recovery in the second half of 1961, which would lift the seasonally adjusted rates above the indicated unit increase over 1960 of 50,000.

By the end of the third quarter of 1960 the new housing market had not responded to the easing of mortgage credit. Indications now are that the housing downturn has bottomed out. Early in 1959, the seasonally adjusted rate was at 1.6 million units. By September 1960 it had plunged to the year's low of 1.1 million units. But last week the Commerce Department's Census Bureau announced that the seasonally adjusted rate in October rose to 1,231,000.

Rising vacancy rates, relatively high interest rates, and rising construction costs are among the key factors adversely affecting the housing supply-demand situation. On the other hand, the low down-payment requirements and the trend towards a lengthened period of mortgage amortization continue to be favorable influences, although they may

Construction Spending Forecast*

(in millions of dollars)

Type of Construction	1959 Actual	1960 Estimate	1961 Forecast	% Change 1959-60	% Change 1960-61
TOTAL NEW CONSTRUCTION	$56,233	$55,100	$57,300	− 2	+ 4
Private	39,892	38,900	40,250	− 2	+ 3
Residential buildings (nonfarm)	24,469	21,950	22,600	−10	+ 3
New dwelling units	19,233	16,300	16,750	−15	+ 3
Additions, alterations	4,468	4,750	4,850	+ 6	+ 2
Nonhousekeeping	768	900	1,000	+17	+11
Nonresidential buildings	8,859	10,075	10,550	+14	+ 5
Industrial	2,106	2,900	3,100	+38	+ 7
Commercial	3,930	4,050	4,150	+ 3	+ 2
Office bldgs, whs	1,954	2,050	2,250	+ 5	+10
Stores, restr, garages	1,976	2,000	1,900	+ 1	− 5
Other nonresidential buildings	2,823	3,125	3,300	+11	+ 6
Religious	947	1,045	1,075	+10	+ 3
Educational	525	590	650	+12	+10
Hospital, institutional	570	575	625	+ 1	+ 9
Social, recreational	550	675	700	+23	+ 4
Miscellaneous	231	240	250	+ 4	+ 4
Farm construction	1,362	1,300	1,300	− 5	0
Public utilities	4,995	5,275	5,500	+ 6	+ 4
Railroads	251	300	275	+20	− 8
Telephone, telegraph	952	1,100	1,050	+16	− 5
Electric light and power	2,072	2,050	2,050	− 1	0
Gas	1,600	1,700	2,000	+ 6	+18
Other public utilities	120	125	125	+ 4	0
All other private	207	300	300	+45	0
Public	16,341	16,200	17,050	− 1	+ 5
Residential buildings	962	725	775	−25	+ 7
Nonresidential buildings	4,514	4,800	5,175	+ 6	+ 8
Industrial	368	400	400	+ 9	0
Educational	2,656	2,875	3,100	+ 8	+ 8
Hospital, institutional	428	400	425	− 7	+ 6
Administrative, service	568	615	700	+ 8	+14
Other nonresidential	494	510	550	+ 3	+ 8
Military facilities	1,488	1,325	1,325	−11	0
Highways	6,000	5,700	6,000	− 5	+ 5
Sewer, water systems	1,467	1,500	1,525	+ 2	+ 2
Sewer	906	890	835	− 2	− 6
Water	561	610	690	+ 9	+13
Public service[1]	551	650	650	+18	0
Conservation, development[2]	1,130	1,275	1,350	+13	+ 6
All other public	229	225	250	− 2	+11

* New construction put in place, U. S. Dept. of Commerce
[1] Includes all state & local power projects
[2] Includes Corps of Engineers, Bureau of Reclamation & TVA

no longer be the strong stimulants they once were. Moreover, the continuing shift of population to the suburbs, the strong demand for apartments, the high level of savings, and the large volume of mortgage repayments to institutions that cannot shift easily to other forms of investment, all tend to support the expectation that housing starts next year will exceed those of this year.

Somewhat uneven movements among the components of the Gross National Product, indications of a reduction in business profits, and continued emphasis on modernization rather than increase of capacity probably will slow the market for new industrial building. Although research and development still results in a demand for new structures to produce new products stemming from R&D, industrial construction appears to be in line for only a 7% gain in 1961. Much of this rise will be carryover of activity on projects started in 1960. The anticipated $3.1-billion level for 1961 equals the outlays in 1956, which were surpassed only by the 1957 high of $3.6 billion.

Commercial construction in 1960, construction of office buildings and warehouses is expected to increase 10%. The stores, restaurants and garages group is expected to decline by about 5%.

In office buildings, the drive for modern conveniences and for the prestige associated with new ultramodern buildings is resulting in some building ventures that appear to be somewhat speculative in nature.

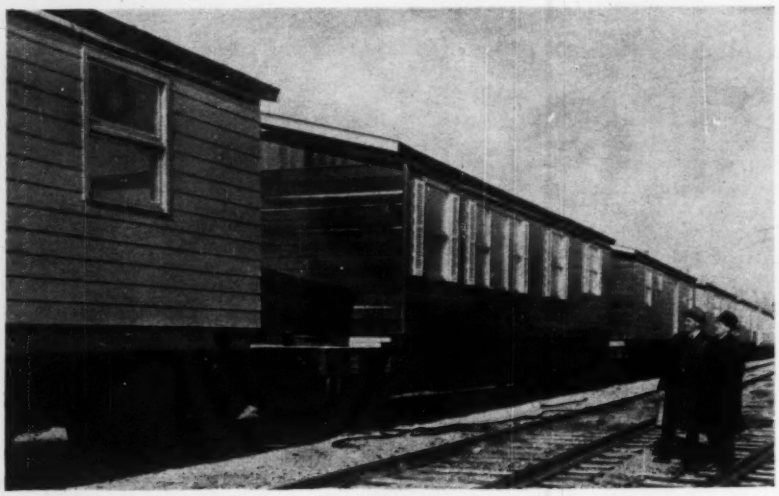
In the stores category, the shopping center building program appears to be more conservatively inspired, with large retail chains increasingly providing the leadership for activity in this field. A slowdown in residential construction tends to inhibit, although belatedly, light commercial construction.

Highway construction promises to increase $300 million over 1960, matching the record $6-billion total of 1959. The drop in 1960 construction follows the $400-million advance in 1959, which was related to anti-recession moves in 1958, when a step-up of spending resulted from the Federal Aid Highway Act of 1958. Prospects in 1961 are strongly influenced by the fact that less funds need to be allocated for right-of-way purposes, thereby making more funds available for construction.

Public housing starts in 1961 are expected to number about 50,000, compared to 45,000 units in 1960. Expenditures in 1960, however, are off the '59 pace by about 25%. That's the biggest drop of any construction category, even though starts for 1960 may exceed 1959 by about one-fifth. This disparity between expenditures and starts is due to an extremely low level of starts in the first half of the year. The Capehart housing program, at its height in 1958 when 35,000 starts were made, dropped to 15,000 units in 1959, and is heading for only 10,000 units this year. A further reduction in new Capehart units is foreseen for 1961. Federally aided public housing, however, will show new strength because late 1960 activity will result in a large carryover of work into 1961.

Military construction expenditures in 1961 will continue to be influenced by increasing requirements of the missile program. This increase will be offset by some decline in the regular military building program. As a result, total expenditures will probably approximate the 1960 level.

Other construction categories for which substantial federal funds are appropriated will show increases on top of those recorded for 1960. The group with the largest anticipated percent increase in 1961 is administration and service buildings. This category is strongly influenced by a "breakthrough" program—the largest federal program for building office space on record.



Prefab houses built in Indiana go . . .

By Rail and Barge to Alaska

A midwestern home manufacturer uses its production technique as one of its main selling arguments on Alaskan builders, who must race against time if they are to make any money during that state's short construction season.

The houses arrive at a builder's development in two sections, but they are complete to the drapes and curtains on the windows. All the builder has to do is place the sections on a foundation, join and seal them together, and connect the utilities. This takes only 10 to 20 man-hours.

The latest shipment of 41 houses went out from Carlisle, Ind., last week on 82 flatcars of the Chicago, Milwaukee, St. Paul and Pacific Railroad Co. At Seattle they will be transferred to barges, which will carry them to Anchorage. Total distance traveled: almost 4,000 miles.

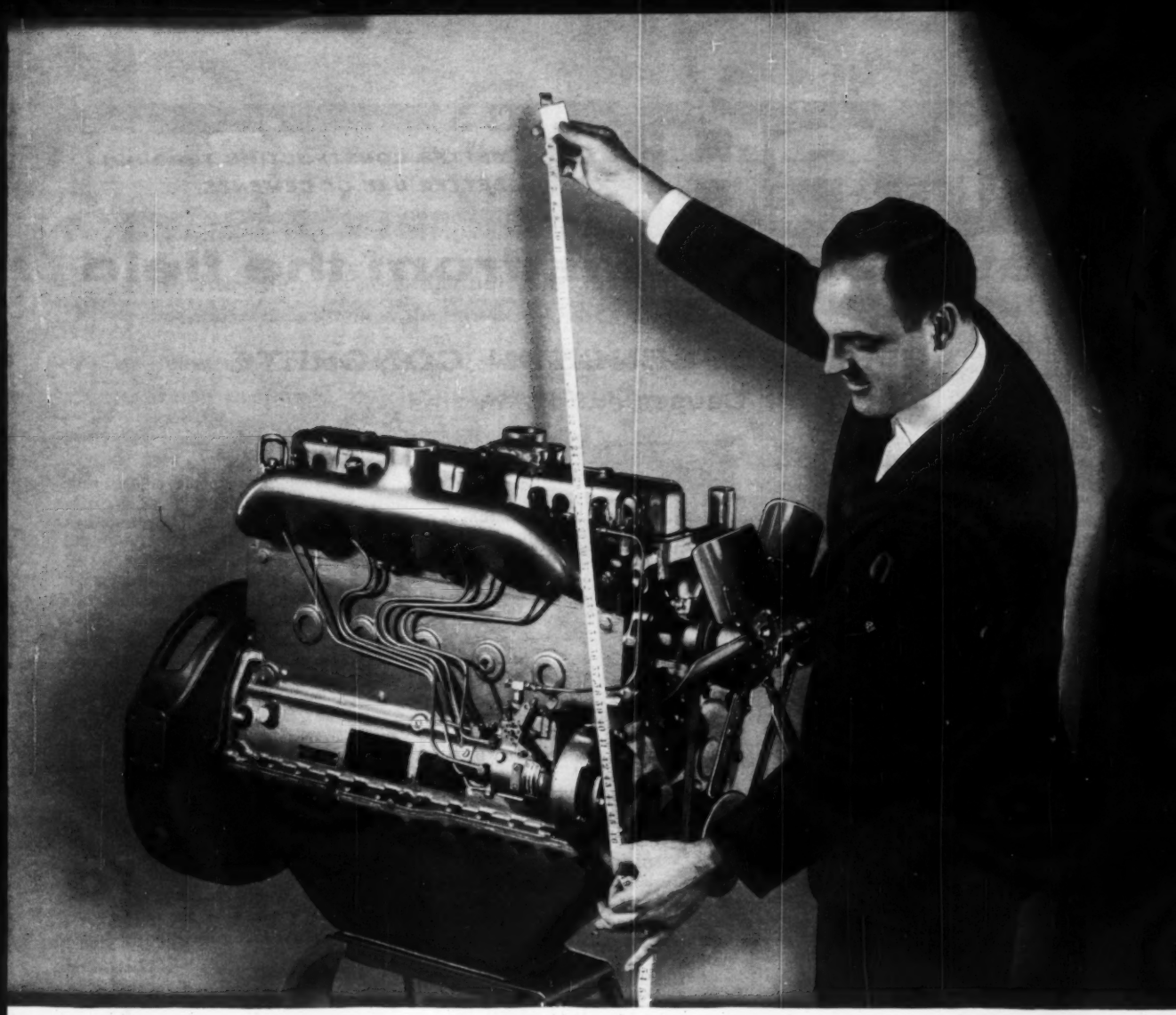
Two sections equal one house "cut" in half along its longitudinal dimension. Each section is 44 ft 4 in. long by 11 ft 8 in. wide. The open halves are sealed watertight during transit.

H. C. McKinley, president of Midwest Quality Homes, the manufacturing company, says the houses are sold from samples located at the site, the buyers choosing the exterior and interior colors, appliances, fixtures, house style and elevation. The house then is built in the factory to the buyer's order.

Each house is delivered with all equipment installed—kitchen cabinets, refrigerator, range, sink, bathroom fixtures, water-heating tank, heating system, electrical wiring and plumbing.

The most recent shipment brought to 70 the number of houses sent to Modern Homes Inc., the Anchorage developer. The houses are in the $13,000 to $14,000 price range.

Midwest Quality Homes produces about 700 housing units a year, and all are delivered to the sites in two separate, but complete, sections. Some are shipped rail, others by lowbed trailer.



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These are just a few of the ways custom tailoring at Hercules works to meet the requirements of engine users. Possibly Hercules can help to fill *your* power needs more exactly—more economically. Why not meet with us and see?

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ALPHA

BETTER CONSTRUCTION THROUGH
BETTER USE OF CEMENTS

news and notes from the field

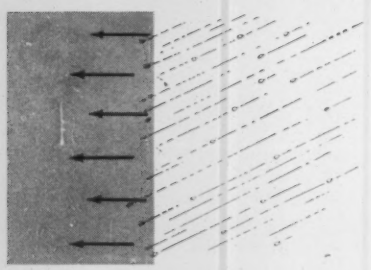
EFFLORESCENCE IN CONCRETE

Causes and Remedies

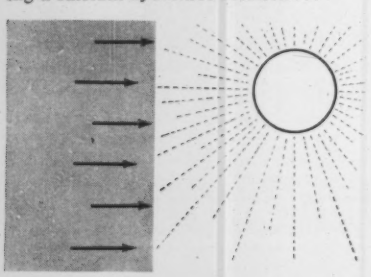
Efflorescence is a white powdery substance deposited on the surface and in the pores of concrete or other building materials. If you were to look at this material under a microscope, you would find it made up of small white crystals. The salt crystals are calcium carbonate and are formed when water enters the concrete, dissolves the salts, leaches to the surface carrying the salts in solution, evaporates and leaves the powder-like white substance known as efflorescence.

"No building material is entirely free from water-soluble salts and the small amounts of such which usually appear in chemical analyses as a few tenths of one per cent, are sufficient when leached out and concentrated at some point on the surface to cause efflorescence."*

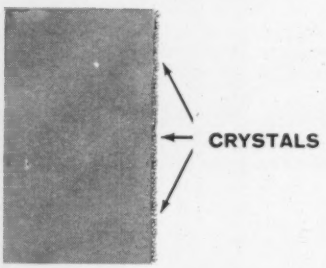
All concrete and concrete products are subject to some efflorescence. The amount and character of the deposits vary widely, apparently depending on the nature of the soluble materials and atmospheric conditions. The deposit may or may not be soluble. In some cases, therefore, it disappears by being washed off by rain. In other cases it may appear once or twice and never again. This is because the hydration products of cement have made the concrete watertight as it gets older.



1. Water penetrates and dissolves salt making a calcium hydroxide solution . . .



2. Calcium hydroxide is leached to the surface . . .



3. Calcium hydroxide combines with carbon dioxide in atmosphere to form calcium carbonate (salt) crystals.

In the case of concrete, mortar, stucco, cast stone or concrete masonry, the hydrated cement contains some calcium hydroxide (soluble) as an inevitable product of the reaction between cement or lime and water. When this soluble material is brought to the surface by water it combines with carbon dioxide in the air, forming calcium carbonate (very slightly soluble) which appears as the whitish deposit known as efflorescence.

Efflorescence usually appears after long rainy periods. In summer the rain evaporates so quickly that comparatively small amounts of the salt are brought to the surface.

Efflorescence is an indication of porosity and any preventive measure must necessarily limit porosity to the point where insufficient water enters the mass to dissolve the salts and transport them to the surface.

Cleaning Walls

While calcium carbonate efflorescence is practically insoluble in water, it is easily dissolved by a dilute solution of muriatic acid (1 part concentrated acid to 5 to 10 parts water). Surfaces treated in this way should immediately be washed thoroughly with water. Walls should be thoroughly wetted with water before acid is applied. The acid wash should be tried out on a small inconspicuous section of the wall to note its effect before proceeding with the whole job.

To prevent efflorescence and incrustations it is necessary to provide a structure which will not permit the passage of water. This requires watertight concrete and watertight joints, obtained by proper proportioning, placing and curing. Overwet mixtures and improper curing are common causes of porous concrete. Where necessary, metal water stops should be provided in the joints.

*Technological Paper #349, U.S. Bureau of Standards

Alpha Waterproofed Mortar Cement

Alpha Waterproofed Mortar Cement gives protection from weather, reduces moisture penetration and leaky walls, thus affording effective resistance to efflorescence. By reducing absorption, this waterproofed mortar cement also increases the durability of masonry, helps keep it attractive and stain-free.

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No Solution Yet to Missile Woes

- **So far, there is no indication the government will get a no-strike pledge from labor unions.**
- **New kind of contract cancellation clause has been proposed, but its use looks doubtful.**

The Air Force and the Pentagon have had almost no success so far in getting a sure-fire formula for settling strikes—particularly jurisdictional strikes—that have plagued the missile base construction program.

In the last few months, Secretary of Defense Thomas Gates has called into his office the top government officials involved in the construction program—Air Force and Army Engineers, executives of top contractors, and labor union officials—in an effort to get the lagging construction program back on schedule.

One of the key problems was work stoppages stemming from jurisdictional disputes. The meeting raised hopes that a way would be found sooner or later to get an effective no-strike policy from the labor unions.

The creation of a "Joint Appeals Board for Missile Sites" is being backed by some construction union officials and by some of the top contractor associations, including the Associated General Contractors and the National Constructors Association.

The board would be composed of an equal number of contractor and union representatives. It would have a neutral chairman (possibly John Dunlop, who is chairman of the Construction Industry Joint Conference). Government defense agencies involved in disputes would designate a liaison representative.

Purpose of the board would be to give both sides in a dispute a place to take their appeals when voluntary procedures fail.

The building trades, under such a plan, would presumably bind themselves not to strike or set up picket lines; contractors would agree not to go to the National Labor Relations Board or the courts and would refrain from lockouts. The government would require contractors to comply with these procedures on missile base work.

The building trades may consider the proposal when their Executive Council meets in Washington next week. The outlook for any progress, however, seems doubtful.

But as of now, there is no "no strike" pledge in the offing and the Pentagon's program consists almost entirely of "jaw bone enforcement"—that is, trying by persuasion to keep the contractors and unions from getting into any kind of situation that produces a strike or a work stoppage.

The Pentagon's program may well have kept many work stoppages from occuring—but on a real test involving a dispute between the International Brotherhood of Electrical Workers and the operating engineers, **the dispute** quickly got snarled up in the Taft-Hartley law and the regular industry dispute-settling machinery—with the military experts sitting on the sidelines watching the legal wheels go around.

The first test came at Forbes Air Force Base, Kans., one of the early Atlas bases.

The hope of the military troubleshooters was to make this a test case, since there are millions of dollars of contracts yet to be let, and the military would like to have a pattern established that would apply to the remainder of the missile base program.

What happened was this:

A prime contractor at Forbes is the Kellogg Division of International Telephone & Telegraph. A subcontractor with a contract that calls for laying underground cable is Ets-Hokin-Galvin. E-H-G has a contract with an IBEW local, and uses its workers, including some who operate earthmoving machinery.

This situation provoked a protest from the operating engineers. The union complained to the Joint Board for the Settlement of Jurisdictional Disputes. The contractors (including IT&T and E-H-G) sent representatives. The Board ruled that certain jobs belonged to the operating engineers.

The contractor, however, refused to abide by the award—and, of course, the Joint Board has no enforcement machinery. The result was a one-day work stoppage involving several hundred building tradesmen. This spurred Air Force officials into a flurry of activity and sent the contractor to the legal machinery available to him—that is, the National Labor Relations Board.

With the work stoppage as the basis for his complaint, Ets-Hokin-Galvin went to the office of the NLRB General Counsel charging an unfair labor practice under the Taft-Hartley Act. Under the law, an employer caught in a jurisdictional dispute can use this procedure, and the office of General Counsel has to go into federal court and seek a temporary injunction.

This was done, and Federal Judge Arthur J. Stanley, Jr. issued the injunction, which is being honored by the unions. Meanwhile, the NLRB is investigating the complaint and in due course will hand down a formal ruling. The board hearing will be held in Kansas December 13. This is not likely to settle the dispute because of the board's policy of refraining from making affirmative work assignments.

C. D. Barker, special consultant to Air Force Secretary Dudley Sharpe, tried in the meantime to bring pressure to bear by threatening cancellation of the construction contract of any contractor that does not abide by the machinery available for settling jurisdictional disputes.

However, the Pentagon pressure thus generated turned out for naught in the Kansas case because the Air Force is not a party to the construction contract involved. Instead, the Air Force has a contract with IT&T for operation of the facility—but the construction contract is between IT&T on the one hand, and its subs on the other.

Mr. Barker's effort apparently has made very little headway. Any change in Air Force contracts to include such a contract cancellation clause as he advocated would, of course, have to be written by the legal advisers of the Secretary of the Air Force—and they say that while such a matter is "being discussed," any decision is a long way off. There's no doubt that the Air Force lawyers are highly skeptical of the whole cancellation idea.

One other confusing factor in the situation is this: The new Administration will be taking charge by January 20, and a new Secretary of the Air Force will take over the job now held by Dudley Sharpe.

Unless the confusing picture is completely settled before January 20—and the way things are going, it may not be—the new officials will be in charge, and they may take a different approach from Mr. Sharpe and his subordinates.

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. . . Labor

Supreme Court to

The U. S. Supreme Court agreed last week to review the basis on which three unions have challenged the construction of a $44-million experimental, fast breeder reactor at Lagoona Beach, near Monroe, Mich.

The question is this: Must even the physical construction of a privately owned nuclear facility—as opposed to its operation—be held in abeyance until it has been determined that the plant, when completed, can be operated "without undue risk to the health and safety of the public?"

The Monroe reactor is a project of Power Reactor Development Co., which is composed of 14 public utilities and seven equipment manufacturers. Located on the shore of Lake Erie 30 miles southwest of Detroit, it is intended to demonstrate the practical use of nuclear energy in the production of electrical energy. It is known as the Enrico Fermi nuclear plant.

Three unions raised the question of public safety as soon as the Atomic Energy Commission issued a construction permit for the project in 1956. The unions are the United Auto Workers, International Union of Electrical Workers and United Paper Makers.

Gist of the unions' complaint is that the construction permit is invalid because the AEC has made no positive determination that the reactor can be operated without endangering the public. The unions contend that even the construction of the facility under such ambiguous circumstances is a threat to the safety of their members in the populous Detroit-Toledo area, and jeopardizes their real estate values and job opportunities—and even the value of their labor contracts.

A rehearing by the AEC left the construction permit in force. The unions appealed to the courts, and last June the federal Circuit Court of Appeals in Washington, D. C., sided with the unions. It ruled that the AEC had issued the construction permit without sufficient evidence that the reactor can be operated safely.

Looking at the legislative history of the Atomic Energy Act, the court concluded that Congress intended that not even a construction permit be issued until the commission is reasonably assured that the reactor, when completed, can operate without undue risk to public health and safety.

If the decision is upheld, the peaceful use of nuclear energy may be headed for further delays.

The owner has been allowed, how-

Rule on Reactor

ever, to carry on with the construction phase of the plant during the litigation, although the testing of nuclear equipment is forbidden until the safety issue is resolved. The plant is structurally complete. The 150,000-watt generator and two package boilers have been installed and the turbine was being moved in last week. The project is essentially on schedule.

The AEC has taken the position that it can authorize construction on the basis of preliminary evidence of safety—it will not issue a license for operation until it is satisfied that no undue hazards exist. By allowing construction to proceed while further research and development continues, AEC argued, the owner could save several years time in placing its reactor in operation.

But the lower court said: "The economy cannot afford to invest enormous sums in the construction of an atomic reactor that will not be operated. If enormous sums are invested without assurance that the reactor can be operated with reasonable safety, pressure to permit operation without adequate assurance will be great and irresistible."

The court felt that all doubts should be resolved on the side of safety and added: "We think it clear from the Congressional concern for safety that Congress intended no reactor should, without compelling reasons, be located where it will expose so large a population to the possibility of nuclear disaster."

The dissenting judge saw no reason why the construction permit could not be issued on the basis of "probable" safety, with actual operation of the reactor contingent on subsequent evidence of safety. He said the court had expressed opinions that far exceed its judicial authority.

Minimum Wage Proposal Defeated in Arkansas

A labor-supported proposal to scrap the present $1.25-per-day minimum wage law in Arkansas was defeated in the November 8 election.

The measure would have raised the minimum wage gradually to $1.00 an hour by 1963 and have cut the workweek to 40 hours.

It was put on the ballot by initiative petitions circulated by the Arkansas AFL-CIO. The vote against it was 201,967 to 126,814.

Labor officials attributed rejection of the proposal to heavy opposition from farm and conservative business groups.

OFFICIAL PROPOSALS

Bids: December 15, 1960

Sewerage Project Middletown Township, Bucks County, Municipal Authority Middletown Township, Bucks County, Pennsylvania

Sealed proposals will be received by MIDDLETOWN TOWNSHIP, BUCKS COUNTY, MUNICIPAL AUTHORITY, at the office of the Secretary, in the Township Building, 700 New Rodgers Road, Levittown, Pa., until 8:00 P.M., Eastern Standard Time, Thursday December 15, 1960, and will be publicly opened and read shortly thereafter at the same address. Proposals will cover furnishing all necessary labor, materials, and equipment, and performing all work required for the Contract entitled CONSTRUCTION OF A SEWERAGE SYSTEM. The AUTHORITY reserves the right to reject any or all proposals, and also the right to waive any irregularities in proposals.

Each proposal shall be accompanied by a certified check or bid bond in an amount not less than ten (10) percent of the bid total, all in accordance with the Contract Documents.

Copies of the Contract Documents, including Drawings and Specifications, will be on file (for inspection purposes only) in the Township Building, 700 New Rodgers Road, Levittown, Pa., and a branch office of Gannett Fleming Corddry and Carpenter, Inc., 12 Montgomery Ave., Ardmore, Pa. They may also be seen at the *main office* of Gannett Fleming Corddry and Carpenter, Inc., Engineers, 600 North Second Street, Harrisburg, Pa., from whom they may be obtained upon deposit of $35.00 per set. No more than two (2) sets will be permitted a prospective bidder. Checks shall be made payable to Gannett Fleming Corddry and Carpenter, Inc.

Full refund will be made (to actual bidders only) for return of one (1) set, no more, in good condition within fifteen (15) calendar days after bid opening; refund for return of all other sets within the same periods will be fifty (50) percent of deposit. No refund will be made for Contract Documents returned later than fifteen (15) calendar days after bid opening.

MIDDLETOWN TOWNSHIP, BUCKS COUNTY MUNICIPAL AUTHORITY

Gannett Fleming Corddry and Carpenter, Inc., Engineers

Bids: December 6, 1960

Fairfax County Water Authority Annandale, Virginia Project 14—Division E Transmission Main Closures

Sealed proposals will be received by the Fairfax County Water Authority at the office of the Authority, 4121 Chatelain Road, Annandale, Virginia, or by mail addressed to the Authority, P. O. Box 91, Annandale, Virginia, until 3:00 P. M., EASTERN STANDARD TIME, December 6, 1960, at which time they will be read aloud, and contracts awarded as soon thereafter as practicable for the construction of water transmission mains at various locations in Fairfax County, Virginia.

The work comprises the furnishing of all materials and construction of the water mains and appurtenant work and is included in one division, as follows:

Chain Bridge Road Water Main Closure, comprising approximately 4820 feet of 30-inch concrete pipe water main.

Dunn Loring Road Water Main Closures, comprising approximately 4550 feet of 24-inch concrete pipe water main.

The Instructions to Bidders, Proposal, Agreement, form of Bid Bond, Performance Bond, Plans and Specifications for the work may be examined at the office of the Fairfax County Water Authority, 4121 Chatelain Road, Annandale, Virginia, and at the office of Greeley and Hansen, Engineers, 14 East Jackson Boulevard, Chicago 4, Illinois. Copies of the Plans and Contract Documents may be obtained upon the deposit of $25.00 for each set, to be refunded upon return of such set in good condition within 10 days after the opening of bids.

Each proposal must be accompanied by a bid bond or a certified check on a solvent bank or trust company, made payable to the Fairfax County Water Authority, in the amount of not less than five percent of the total bid, as assurance that the bid is made in good faith.

Bidders must be registered as Contractors in the Commonwealth of Virginia, as provided by Chapter 7 of Title 54 of the Code of Virginia of 1950.

The Fairfax County Water Authority reserves the right to waive any informalities in or to reject any or all bids and to accept the bid which it deems most favorable to the interests of the Authority after all bids have been examined and canvassed.

FAIRFAX COUNTY WATER AUTHORITY
By: James J. Corbalis, Jr.
Engineer-Director

Date: November 14, 1960

Bids: December 15, 1960

General Construction of CHA Project Illinois 2-30, Stage II

The CHICAGO HOUSING AUTHORITY invites properly qualified bidders to submit proposals for all labor and material required to complete the General Construction of CHA Project Illinois 2-30, Stage II. The work includes two 16-story elevator-type apartment buildings containing a total of 288 dwelling units, underground utilities and related site improvements, all in the general area bounded by West Scott Street, North Ogden Avenue, North Clybourn Avenue and North Larrabee Street, Chicago, Illinois.

Bids will be received until 2:00 P.M. C.S.T. on December 15, 1960, by mail or by hand in Room 1500 of the Chicago Housing Authority, 608 South Dearborn Street, Chicago 5, Illinois, immediately after which time and at such place all bids will be publicly opened and read aloud.

Bid documents including plans and specifications may be obtained on or after November 15, 1960 by depositing $75.00 in the form of cashier's check, certified check or telegraphic or postal money order with PACE ASSOCIATES, Architects and Engineer, 53 West Jackson Boulevard, Chicago 4, Illinois.

U. S. Government

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Specifications No. DC-5446) will be received at Fargo, North Dakota, until 10 a.m., Central Standard Time, January 5, 1961, for furnishing labor and materials for Stringing Conductors and Overhead Ground Wires for Jamestown-Fargo 230-Kilovolt Transmission Line No. 2, Transmission Division, North Dakota, Missouri River Basin Project. Location Stutsman, Barnes and Cass Counties, North Dakota. Principal items are 84.3 miles of line—Furnishing and stringing three 954,000 circular-mil, 45/7, ACSR conductors; 84.3 miles of line—Furnishing and stringing two 1/2-inch galvanized steel overhead ground wires; and other work. Completion by February 1, 1962. For particulars, address Bureau of Reclamation, P. O. Box 2553, Billings, Montana; P. O. Box 1993, Fargo, North Dakota; or Building 53, Denver Federal Center, Denver 25, Colorado. Floyd E. Dominy, Commissioner.

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Specifications No. DC-5444) will be received at Madera, California, until 10 a.m. Pacific Standard Time, January 5, 1961, for furnishing labor and materials for Earthwork and Structures, Madera Distribution system, Extension Part 1, Central Valley Project, California. Location northwest of Madera, California, in Madera County. Principal items are Excavation 251,000 cu. yds.; 16,600 lin. ft. Precast Concrete Pressure Pipe; 43,550 lin. ft. Cast-in-Place Concrete Pipe; and other work. Completion time 350 days. For particulars, address Bureau of Reclamation, P. O. Box 689, Madera, California; P. O. Box 2511, Sacramento, California or Building 53, Denver Federal Center, Denver, Colorado. Floyd E. Dominy, Commissioner.

READ THE OFFICIAL PROPOSAL COLUMN OF
ENGINEERING NEWS-RECORD
THIS WEEK AND EVERY WEEK

OFFICIAL PROPOSALS

Bids: December 9, 1960

NOTICE TO CONTRACTORS: STATE DEPARTMENT OF PUBLIC WORKS, ALBANY, N. Y.—Pursuant to the provisions of the Highway Law, and special provisions for projects financed with Federal Aid Funds, sealed proposals will be received until ten-thirty o'clock A.M., eastern standard time on the 9th day of December 1960, by Henry A. Cohen, Director, Bureau of Contracts, 12th Floor, The Governor Alfred E. Smith State Office Building, Albany, N. Y., for the following projects:

County	Contract No.	Name	Miles	Type	Deposit	Estimated Cost of Work
DISTRICT No. 1, N. F. Ronan, Asst. District Engineer, 353 Broadway, Albany 1, New York						
Albany (Rte. 43)	R.C. 60-193	Normanskill Viaduct, S.H. 9109 Delaware, Pt. 2, S.H. 41	1.42	Asphalt Concrete	$34,000 Plans $5	$632,000
Albany (Rte. 155)	PSC 18537	Elimination of the Grade Crossing of Shakers-Watervliet, S.H. 879 and the Delaware and Hudson Railroad	0.61	9" Cem. Conc. Pavt. = 0.57 Mi.; Misc. Work = 0.04 Mi.; RRGS Comp. I-Beam & Plate Girder 11 Sps, 860' Total; Gate House & Fencing	$42,000 Plans $5	769,000
Greene (Rte. 81)	R.C. 60-186	Greenville-Coxsackie, Pt. 2, S.H. 719; Greenville-Coxsackie, Pt. 3, S.H. 1365	4.41	Asphalt Concrete Twin 15' Open Box	$46,000 Plans $5	828,000
Schenectady (Int. Trg. Rte. 890)	FIC 60-18 FISH 60-9	Interstate Rte. Conn. 550 (Michigan Ave. to Schenectady Crosstown Conn., Pt. 1) Project I-890-5(16)	1.41 (2.04 Acc.)	9" Cem. Conc. Pavt., 2 @ 36'; Var. = 1.22 Mi.; Misc. Work = 0.19 Mi.; Access = 1.66 Mi. Cem. Conc. Pavt. & 0.38 Mi. Asph. Concrete; 3 HGS Comp. I-Beam, 4 Sps. 216.5' Tot., 4 Sps. 195.2' Tot.; 4 Sps. 179.5' Tot.; Ped. Underpass Enclosed Box	$160,000 Plans $5	2,900,000
DISTRICT No. 2, L. Ketchum, District Engineer, 109 No. Genesee Street, Utica 1, New York						
Montgomery (Rte. 5)	FAC 60-29 FARC 60-194	Mohawk River Turnpike, Amsterdam-Tribes Hill, S. H. 108, City of Amsterdam, East-West Art. Highway Project F-U-349(15)	2.26	9" Cem. Conc. Pavt., 2 @ 24' Var. = 2.10 Mi.; Asph. Conc. = 0.16 Mi.; Precast Conc. Beam 1 Sp. 31.8'	$72,000 Plans $5	1,314,000
Oneida (Rte. 12)	R.C. 60-163	Marcy Hill-Trenton, S.H. 931	3.60	Asphalt Conc. Type 2A, Incl. Repairs to Bridge No. 1	$16,000 Plans $5	291,000
DISTRICT No. 3, E. E. Towlson, District Engineer, 333 E. Washington St., Syracuse, New York						
Onondaga (Rte. 48)	R.C. 60-185	Baldwinsville-State Fair Grounds, S.H. 8496	2.33	Asphalt Concrete, Type 1A	$1,800 Plans $5	33,000
Onondaga	FAC 60-28	City of Syracuse: West St.-Herald Place Art. Hwy. Project U-446(9)	1.17	Demolition of Buildings	$19,000 Plans $5	341,000
Wayne (Rte. 21)	R.C. 60-190	Palmyra-Marion, S.H. 1714, Marion-Williamson, Pt. 1, S.H. 992	7.16 (1.48 Acc.)	Asph. Conc. Type 1A = 8.64 Mi.; Comp. WF Truss Bridge; 3 Sps. 324' Total	$95,000 Plans $5	1,725,000
DISTRICT No. 4, B. F. Perry, District Engineer, Barge Canal Terminal, Rochester 1, New York						
Livingston	FASS 60-19	Nunda-Dansville, Pt. 2, Co. Rd. Project S-501(3)	5.61	Top Course Bit. Mac. (Asph. Emulsion) = 5.58 Mi. Misc. Work = 0.03 Mi.	$46,000 Plans $5	824,000
Monroe	FISH 60-13 FAC 60-26	Interstate Rte. Conn. 580 Rochester Western Expressway (Howard Road to Rochester City Line) Rochester Outer Loop (Chili Ave. to Lyell Ave.) Project I-490-2(20); U-UG-1093(9)	1.79 (5.20 Acc.)	9" Reinf. Conc. Pavt., 2 @ 24' Var. = 1.79 Mi.; Acc. = 3.77 Mi. Cem. Conc. Pavt. & 1.43 Mi. Asph. Concrete 1 HGS-Prestress. Conc. Beam Br. 4 Sps., 193' Tot. 6 HGS Comp. I-Beam Brs., 3 Sps. 136.5' Tot.; 3 Sps., 126.5' Tot.; 3 Sps. 148' Tot.; 3 Sps. 203.8' Tot.; 4 Sps. 206.5' Tot.; 4 Sps. 217.5' Tot.; 4 HGS Comp. Pl. Gird. Brs. 3 Sps. 281.3' Tot.; 3 Sps. 269.1' Tot.; 1 Sp. 150'; 1 Sp. 150'; 1 RRGS Thru Pl. Gird. Br. 2 Sps., 144' Tot.	$350,000 Plans $10	6,179,000
DISTRICT No. 5, E. G. H. Youngmann, District Engineer, State Office Bldg., 65 Court Street, Buffalo 2, New York						
Cattaraugus	FAC 60-13	City of Olean: East-West Art. Hwy. (East State Street: Union Street to Barry Street) Project U-141(6)	0.14	Asphalt Concrete Type 2A = 0.09 Mi. Misc. Work = 0.05 Mi.	$4,500 Plans $5	80,000
DISTRICT No. 7, R. W. Sweet, District Engineer, 444 Van Duzee Street, Watertown, New York						
Clinton (Int. Trg.) Rte. 87)	FISH 60-15	Interstate Rte. 502, Sections 7C-11 and 7C-12 (Moffitt Rd. to Stratton Rd.) Project I-87-4(10)	6.19 (1.04 Acc.)	Asphalt Concrete Type 1A; HGS Prestressed Conc. Beam 7 Sps. 352.6' Total	$195,000 Plans $5	3,565,000
Clinton (Int. Trg. Rte. 87)	FISH 60-14	Interstate Route 502, Sections 7C-2 and 7C-3 (Stratton Rd. to Miner Farm Rd.) Project I-IG-87-4(9)	5.44 (2.51 Acc.)	Asph. Conc. Ty. 1A = 7.76 Mi.; Misc. Work = 0.19 Mi.; 4 HGS Prestress. Conc. Beam; 6 Sps. 320' Tot.; 3 Sps. 178' Tot.; 3 Sps. 152' Tot., 6 Sps. 314' Tot.; 1 Br. Reinf. Conc. Box 2 Sps. 15' Ea.; 1 Br. Reinf. Conc. Open Box 2 Sps. 15' Ea.; 2 RRGS Prestress. Conc. Beam; 3 Sps. 133' Tot., 3 Sps. 133' Tot.	$255,000 Plans $10	5,022,000
Jefferson (Rte. 11)	R.C. 60-189	Watertown-Philadelphia, Pt. 1-C, S.H. 5681; Watertown-Philadelphia, Pt. 2, S.H. 5617	3.66	Asph. Conc. Ty. 1A = 3.60 Mi.; Misc Work = 0.06 Mi.; RRGS-Comp. WF Beam, 1 Sp. 82'	$110,000 Plans $5	2,000,000
Lewis (Rte. 26)	R.C. 60-188	West Leyden-Constableville, Pt. 2, S.H. 8188; Constableville-Lyons Falls, Pt. 1, S.H. 1600	1.62	Asphalt Conc. Ty. 1A Comp. I-Beam Br. 2 Sps. 124.1' Total	$35,000 Plans $5	609,000
DISTRICT No. 8, K. G. Rauer, District Engineer, Pleasant Valley Rd., Poughkeepsie, New York						
Dutchess (Rte. 22, 55)	FARC 60-110	Billings-Poughquag, S.H. 8525, Stonehouse-Stormville, S.H. 1162, Stonehouse-Pawling, S.H. 1677, Pawling-Patterson, S.H. 343, Pawling Village, S.H. 5009 Project F-1025(3); F-FG-625(5); F-350(23)	8.23 (0.57 Acc.)	Asph. Conc. = 7.63 Mi.; 9" Cem. Conc. Pavt. 2 @ 24' = 1.17 Mi. Bridge-Reinf. Conc. Box 20.8' Span RRGS-NYCRR Prestress. Conc. Beam-3 Spans 139.4' Total: HGS-Comp. I-Beam, 4 Spans, 200.2' Total	$230,000 Plans $5	4,170,000
Dutchess	FAC 60-27	Poughkeepsie: North-South Art. Project U-322(19)	2.61	Demolition of Buildings	$4,600 Plans $5	84,000
DISTRICT No. 9, J. C. Frederick, District Engineer, 71 Frederick Street, Binghamton, New York						
Delaware (Rte. 17)	R.C. 60-187	East Branch-Sullivan Co. Line, Pt. 1, S.H. 5383A; Hancock-East Branch, Pt. 2, S.H. 5246; Hancock-East Branch, Pt. 3, S.H. 5456	7.36 (4.36 Acc.)	9" Cem. Conc. Pavt. 2 @ 24' = 7.36 Mi.; Access = 1.85 Mi. Cem. Conc. Pavt.; 2.31 Mi. Asph. Conc. Pavt. & 0.20 Mi. Fdn. Crse. Gran. Mat. Type A; 3 Brs. Reinf. Conc. Boxes, 23.2', 24.4', 20.4' Skew Spans; 1 Br. Comp. Haunched Gird. & Beam, 5 Sps, 576' Tot.; 6 Brs. Comp. Beam, 3 Sps. 165' Tot.; 4 Sps. 350' Tot.; 9 Sps. 711' Tot.; 3 Sps. 518' Tot.; 1 Sp. 64'; 4 Sps. 165' Tot.; 1 Br. Reinf. Conc. Rig. Fr., 1 Sp. 50.3'	$640,000 Plans $10	11,600,000
Sullivan (Rte. 17)	R.C. 60-176	Liberty-County Line, Pt. 2, S.H. 5234	0.18	Asph. Conc. Type 1A Comp. I-Beam Bridge 113' Span	$12,000 Plans $5	217,000
DISTRICT No. 10, A. M. Sarr, District Engineer, 325 W. Main Street, Babylon, New York						
Bronx (Int. Trg. Rte. 95)	FICBE 60-5	Interstate Rte. Conn. 511 Cross Bronx Expressway-Cont. 2A (Major Deegan Expressway Interchange) (Undercliff Ave. to Plimpton Ave.) Project I-95-1(47)	0.18	Cement Conc. Pavt. with Carbon Black; 3 HGS-Rig. Fr., 3 Sps. 186.6' Tot., 2 Sps. 107.1' Tot., 1 Sp. 36.7' Tot., 1 HGS Comp. Beam 1 Sp. 170.2'; 1 HGS Comp. Beam, 4 Sps. 267.6' Tot. & 1 Sp. Conc. Slab 48'; 1 HGS Pl. Gird. 1 Sp. 209'	$421,000 Plans $10	7,652,000
Kings (Int. Trg. Rte. 278)	FIGE 60-3	Interstate Rte. Conn. 512 Gowanus Expressway, Cont. 2 (Hamilton Ave: Clinton St. to Second Ave.) Project EI-278-1(54)15	0.61 (0.57 Acc.)	7½" Reinf. Conc. Slab Roadway (on Viaduct) = 0.56 Mi.; Misc. Work = 0.05 Mi., Sheet Asph. Pavt. (Street Repairs) = 0.57 Mi.; Widen and Strengthen Exist. Elevated Steel Structure, 33 Sps. = 2,946' Total	$600,000 Plans $5	1,083,000
Kings	FAPETS 60-1	Prospect Expressway: Fort Hamilton Parkway Intereh. (Greenwood Ave. to Beverly Rd. FAPE 59-1) Project U-1081(6)	0.54	Traffic Signs	$2,500 Plans $5	46,000
Nassau (Rte. 27)	FARC 60-191	Conduit Boulevard-Cont. 4, S.H. 5701A, Pt. 5, (Beech St. To Unqua Road) Project U-947(23)	3.85	Cem. Conc. Pavt. with Carb. Black = ½ of 2.74 Mi. Asph. Conc. = ½ of 2.74 Mi.+ 1.02 Mi., Misc. Work = 0.09 Mi.	$150,000 Plans $5	2,733,000
Nassau (Rte. 24)	FALIE 60-4	Long Island Expressway, Cont. 3, (Guinea Woods Road to Jericho Turnpike) Project U-862(29)	4.45 (5.08 Acc.)	Landscaping; Traffic Signs; Delineators	$13,000 Plans $5	237,000
Nassau (Rte. 24)	FALIETS 60-5	Long Island Expressway-Cont. 5, (Jericho Turnpike to South Oyster Bay Road) Project U-862(30)	3.39 (5.99 Acc.)	Traffic Signs	$5,000 Plans $5	93,000
Nassau (Rte. 107)	R.C. 60-192	Massapequa-Glen Cove, S.H. 9017, (Merrick Road to Hempstead Turnpike)	4.10	Asphalt Concrete Pavt.	$46,000 Plans $5	841,000
Suffolk	HSPTS 60-2	Heckscher State Parkway, Cont. No. 4, Sunrise Highway to Heckscher State Park	6.27 (4.43 Acc.)	Traffic Signs	$2,500 Plans $5	45,000
Nassau & Suffolk	OP 60-1	Ocean Parkway (Tobay Beach to Gilgo State Park)	3.83	Highway Slope Protection	$35,000 Plans $5	668,500

(Continued on opposite page)

OFFICIAL PROPOSALS

(Continued from opposite page)

Any projects in this letting that are on the Federal Aid highway systems are subject to the provisions of the "Federal-Aid Highway Act of 1956", being Public Law 627, 84th Congress, approved June 29, 1956, and are also subject to the applicable New York State statutes.

In compliance with the provisions of Section 115 (Prevailing Rate of Wage), Public Law 627, the minimum wages to be paid laborers and mechanics are included in wage schedules that are set out in the bid proposal.

Maps, plans, specifications and proposal forms may be seen and obtained at the office of the State Department of Public Works, Bureau of Contracts, Albany, N. Y., and at the office of the District Engineers noted above, and may also be seen at the office of the State Department of Public Works, 270 Broadway, New York City.

If the deposit is $10.00 or more, full refund for one copy of the plans and specifications will be made to a bidder for the particular project, if such plans and specifications are returned in good condition within 30 days after the award of the contract or after the rejection of the proposal. The successful bidder is not required to return the copy of the plans and specifications in order to be entitled to such refund. If the deposit is $10.00 or more, partial refund will be made for the return of all other copies of plans and specifications in good condition within 30 days after the award of the contract or the rejection of the proposal.

Special attention of bidders is called to "Information for Bidders" in the Public Works Specifications, and to the special provisions applying to projects financed with federal funds. Award of a contract is subject to priorities and allocations under the Defense Production Act of 1950, as amended, and all regulations issued thereunder.

Proposal for each contract must be submitted in a separate sealed envelope with the name and number of the contract plainly endorsed on the outside of the envelope. Each proposal must be accompanied by draft or certified check payable to the order of the "State of New York, Commissioner of Taxation and Finance" for the sum as specified in the advertisement and the proposal. The retention and disposal of the bidding check, the execution of the contract and bond shall conform to the provisions of the Highway Laws, as set forth in "Information for Bidders".

The right is reserved to reject any or all bids.

J. BURCH McMORRAN
SUPT. OF PUBLIC WORKS

Bids: December 6, 1960

Feeder Road Program

MINISTRY OF PUBLIC WORKS
REPUBLIC OF EL SALVADOR

BIDS: December 6, 1960

NOTICE TO CONTRACTORS

The Ministry of Public Works of the Republic of El Salvador advises that on December 6, 1960 bids will be received for the construction of a major portion of the proposed Feeder Road Program of the country. The Specifications, Plans and Contract Documents will be for sale in El Salvador on October 31, 1960.

All Contractors, interested in taking part in this bidding **are requested** to obtain the necessary Documents, Plans and Specifications from the Office of the Proveedor Especifico de Obras Publicas, Edificio Morazan a C. P., San Salvador, El Salvador, C. A. All requests must be accompanied by a certified check in the amount of Sixty Dollars ($60.00) which will not be returned.

MINISTRY OF PUBLIC WORKS
REPUBLIC OF EL SALVADOR,
C. A.

Contractors Watch This Section—

for new projects. Publish your announcements through the proposal sections of *Engineering News-Record* and get their bids.

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Subject to Agency Commission.

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• POSITIONS VACANT

Civil Engineer experienced in office and field work covering heavy construction, road, bridge and dam construction. Give full details as to age, experience, marital status, salary required and reference in first letter. P-5599, Engineering News-Record.

Estimators senior. Civil, architectural and mechanical. Government facilities and buildings. Airports, dams and hydro-electric facilities. International bidding, office in New York. P-5590, Engineering News-Record.

Director of Specifications Department. Large Midwest consulting firm has immediate opening for capable individual with broad experience in specification writing for all branches of building construction work. Must also possess administrative ability. Send complete resume of educational background and experience, including personal qualifications and small photograph to P-5347, Engineering News-Record.

Draftsmen, Structural—Experienced, Checkers and detailers of structural steel shop dwgs. Relocation expenses. Fink & Zwecker Co., 1100 Crescent Ave., N.E., Atlanta 9, Ga.

Estimator — For established contractor in Deep South Metropolitan area, specializing in Heavy Construction, Foundations and Sewer and Water Plants. Graduate Civil Engineer, Age 30 to 38 preferred. P-5645, Engineering News-Record.

Senior Cost Engineer. Must be familiar with the Uniform System of Accounts for Electric Utilities. Duties will consist of analyzing completed major construction projects for an Electric Utility. Experience with the Federal Power Commission or a State Public Service Commission would be desirable. Some experience with the Property Record Department of any Electric Utility would also be an asset. Please send complete information on experience, references, salary requirements, and availability. Indianapolis Power & Light Co., 25 Monument Circle, Indianapolis 6, Indiana, Employment Division.

Budget & Fiscal Specialist: Needed to complete Advisory Group assigned to assist Government of South Vietnam in organizing a Department of Highways in the Ministry of Public Works for the planning, administration, coordination and supervision of all highway activities and appurtenant services. Must be familiar with modern highway operations with special knowledge of budget requirements, office procedures, and accepted AASHO accounting practices. Will be required to make studies of and recommend field forms and procedures for the reporting and proper control of incoming available funds, both maintenance and construction; and for the expenditures therefrom. Will supervise studies of present costs and assist in preparing annual budgets for the operation of a national highway system. Will be at all times in a position of training local personnel to perform above duties. College education or equivalent in accounting and office precedures required. Broad knowledge of highway and fiscal budgeting and control with at least ten years of highway budget and cost records and control. Legal or business administration may be advantageous. Two year employment contract. Dependents authorized to accompany. Salary to $12,000 per annum plus housing. U.S. citizenship required. Send resume or write for application blank to Capitol Engineering Corporation, Dillsburg, Pennsylvania.

• POSITIONS VACANT

Highway Construction Engineer: Senior personnel needed to supervise construction of highways and bridges in South Vietnam. Duties include instruction of on-the-job trainees. High degree of initiative, judgment, and skill in handling human relations required in addition to professional competence. Minimum ten years experience desirable on construction supervision of highways. Must be registered. Age limit 65 years. Travel in bachelor status only under two year employment contract. Open to U.S. citizens only. Salary to $12,500 per annum plus housing and subsistence. Send resume or write for application blank to Capitol Engineering Corporation, Dillsburg, Pennsylvania.

Civil Engineers—One with soil mechanics and general testing background—one with knowledge of design and construction of utilities for subdivisions and municipalities. Both must be capable, and have ability for client relations and managing, and be registered or qualified for registration in Florida. Stock purchase agreements available. Location Central Florida with established consulting firm. P-5673, Engineering News-Record.

Engineers—Structural. Expd. in design of schools, hospitals, housing, etc.; concrete & steel, for consulting engineers office, New Jersey. Write giving education, exp. & salary: Box 1109, 1501 Bdway., N.Y. 38, N.Y.

Sanitary Engineer. Civil or Sanitary Graduate preferred. Location Lancaster, Pennsylvania. Established consulting firm has permanent position for young engineer. Experience or training in design of water and sewage facilities and treatment plants desired. Send complete resume, with references and salary desired to H. F. Huth Engineers, Inc., 53 North Duke Street, Lancaster, Penna.

Position of Town Engineer. Salary Open, Apply Town Manager of Wethersfield, Connecticut, must be able to be registered in the State of Connecticut.

• POSITIONS WANTED

Project Manager—Chief Estimator 17 years experience large building construction. Desires relocation in Central or Southern Florida. PW-5552, Engineering News-Record.

Situation Wanted—Former officer large railroad twenty years track and good construction, maintenance, terminal and line operation, administration and negotiation labor contracts. Not CE. PW-5554, Engineering News-Record.

Construction executive age 37 qualified manager of equipment maintenance division. Prefer large earthmoving company. PW-5579, Engineering News-Record.

Master mechanic desires permanent position with heavy construction company. 12 years field and shop experience on all types of machinery. Excellent labor relations and a good pusher. PW-5584, Engineering News-Record.

Construction Manager 25 yrs. in heavy commercial and Industrial construction. Detailed knowledge all phases structural, mechanical including estimating, scheduling, office and field supervision, cost control and organizational ability. G. K. Chiles, 211 Del Amigo Rd., Danville, Calif. Vernon 7-5206.

General Manager 22 yrs. all phases hvy. constr. Contract administration & project supervision, estimating, procedures, claims. Major projects U. S. & O. S. PW-5578, Engineering News-Record.

(Continued on the following page)

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P-5676, Engineering News-Record
Class. Adv. Div., P.O. Box 12, N.Y. 36, N.Y.

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P-5521, Engineering News-Record
Class. Adv. Div., P.O. Box 12, N.Y. 36, N.Y.

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• *POSITIONS WANTED*
(Continued from preceding page)

Engineer-Manager. PE, BSCE, MASCE, MNSPE. Age 33. Experience: 7 years responsible field engineering, construction supervision, structural design, and project coordination of heavy industrial and commercial structures. Past year managing own light-construction business. Desires management career opportunity in industry, engineering, or with general contractor. Inquiries acknowledged. PW-5605, Engineering News-Record.

Engineering Executive. Wide industrial, chemical and civil experience; all phases administration and management. Organize and direct large design jobs or work in consulting and exec. asst. capacities. Proposals, reports, contracts, liaison, trouble shooting, P.E. in 5 States. PW-5598, Engineering News-Record.

Superintendent capable complete charge experienced heavy excavation and grading engineering and estimating. Now employed, available soon. P.O. Box 118, Des Moines 1, Iowa.

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Project Manager, B.S.C.E. Registered P.E. experienced construction water works, sewers, port development, pipe lines, foreign field, available immediately, short or long assignments. PW-5642, Engineering News- Record.

Civil Structural Engineer, M.S., P.E. Experienced in administration, construction, design of buildings, bridges, highways. Seeks position with engineering or construction firm. Relocate domestic or foreign. PW-5635, Engineering News-Record.

General Management—Project Manager— Proven record of successful management and field operation. Registered P.E. with 20 years general construction experience, estimating to final. Want to relocate western U.S. or foreign assignment, in married status. PW-5569, Engineering News-Record.

Chief Estimator—Engineer. 12 years experience commercial, industrial, heavy construction. Capable of handling jobs from takeoff to completion. Presently employed but willing to relocate. PW-5364, Engineering News-Record.

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Const. Supt-Engineer, 46. Heavy experience Chemical Plants, Atomic Installations, Power Plants, Paper Mills, Sugar Mills, Dams, Institutional Work. Bid to start up, including Mechanical Installation. PW-5666, Engineering News-Record.

Professional Civil Engineer and Registered Land Surveyor wants position with General Contractor in Connecticut. PW-5669, Engineering News-Record.

Construction Engineer; Superintendent, BSCE age 34, married. Nine and one-half years experience. Know Industrial Construction from Bidding to Final Billing. PW-5653, Engineering News-Record.

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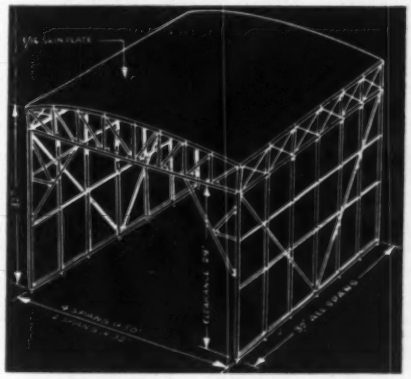

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ENR—T1/3

Hopes for Water

THE DRAMATIC PROMISE of potential technological developments is sometimes so bright and alluring that it throws into comparative shadow the more solid but stodgier realities of the present. A case in point is the desalting of sea water.

Unlike the visionary pot of gold at the end of the rainbow, which recedes as you approach, this hope for the future becomes more nearly attainable at every step. Desalting is technically achievable now, even economically feasible in a few instances. It is a great hope for solving water shortage problems for all time.

But the time is not yet. No major breakthrough has occurred, and none is in immediate sight. In various locations, working installations are doggedly chipping away at the cost of producing fresh water from salt or brackish sources. But even if the cost is cut to half its present level, desalted water will still cost several times as much as natural fresh water (ENR Nov. 3, p. 24). Remote catchments and long distance transmission and pumping, expensive as they are, are still far cheaper than desalting, even for such seaside cities as San Francisco, Los Angeles and New York. New York City is presently confirming this fact by construction of yet another reservoir more than 100 miles from the city, and Los Angeles, along with the rest of California, has just put its approval on a multibillion-dollar spending program involving the transfer of water over 500 miles (see below).

This is not to say we should slack off in our research to find cheaper ways of getting water. Far from it. We should continue and expand our research into desalting—and cloud seeding and all the other fields that show promise. But we must keep them in perspective and not lose sight of the fact that the real answer to water shortages in the U. S. now and for a long time to come (except for a scattered few spots) is conservation of what we have. That means planning and construction of storage reservoirs, aqueducts, water and sewerage systems, and treatment plants; and it means expansion of efforts to conserve and re-use water.

We have it on good authority that we are not about to run out of water in the U. S. What we have to do is beat the problems of distribution and pollution.

Dollars for Water

VOTERS IN CALIFORNIA have put their state into the water resource construction business in a big way with their approval of the $1.75-billion bond issue (ENR Nov. 17, p. 24). This step was a long time in coming, and it was the decisive one that remained to be taken. Yet it must be pointed out that many serious problems still must be faced before the plan becomes a working project for California and a working life-size model for other areas where true region-wide water resource development will someday be essential.

History of the state's water construction program can be traced back nearly 40 years. California carefully developed its first State Water Plan back in the Twenties, then found it financially impossible during the depression years that followed. The plan, in effect, was taken over by federal agencies and developed as the Central Valley Project. In the decade following World War II, California's engineers reassessed the water needs of the state and developed a new, even more inclusive plan. The part of it including Oroville Dam and the San Joaquin-Southern California Aqueduct system was recommended for early construction. In 1956, the legislature created the Department of Water Resources, giving the state an administrative agency capable of handling a huge construction program. In 1959, the legislature acted at the insistence of Gov. E. G. Brown and voted to submit the huge bond proposal to the electorate. Thus, the vote cast this month was but another step, albeit a decisive one, in a long series.

In further development of the plan, unnecessary obstacles could be created. All interested parties—the governor and water-using agencies included—will be aware of continued opposition in the state legislature, where there could be an attempt to delay progress. The legislature can help progress by making clear in broad terms the type of repayment contracts to be executed with water-using agencies. One such contract—the biggest to be worked out—has been signed with the Metropolitan Water District of Southern California, but lack of legislative fiat made it very difficult to reach agreement on many points.

Sound planning must continue. While the engineering is fairly well detailed, there remain important problems to be solved: Important details of Oroville Dam are still to be determined; it is definitely to be the highest earth-and-rock fill ever undertaken. Design of the Tehachapi Mountain pump lifts must be completed; one stage is to lift water more than 2,000 ft—an unprecedented height.

The bond sales and the construction schedule must be carefully worked out. Reports of competent engineers have suggested delaying start of Oroville Dam; the water it will store will not be needed for some time, and its financing might better be handled later in the over-all program. But Oroville Dam could prevent possible floods if built early, and its power plant could produce revenue from the time of its completion.

Much credit for the engineering and planning phases of the water project now approved is due Harvey Banks, who is soon to leave the post of California's Water Resource Director. Credit is also due Governor Brown for the big push he gave the plan. But both Mr. Banks' successor, William E. Warne, and the governor still face great challenges in getting the project under way.

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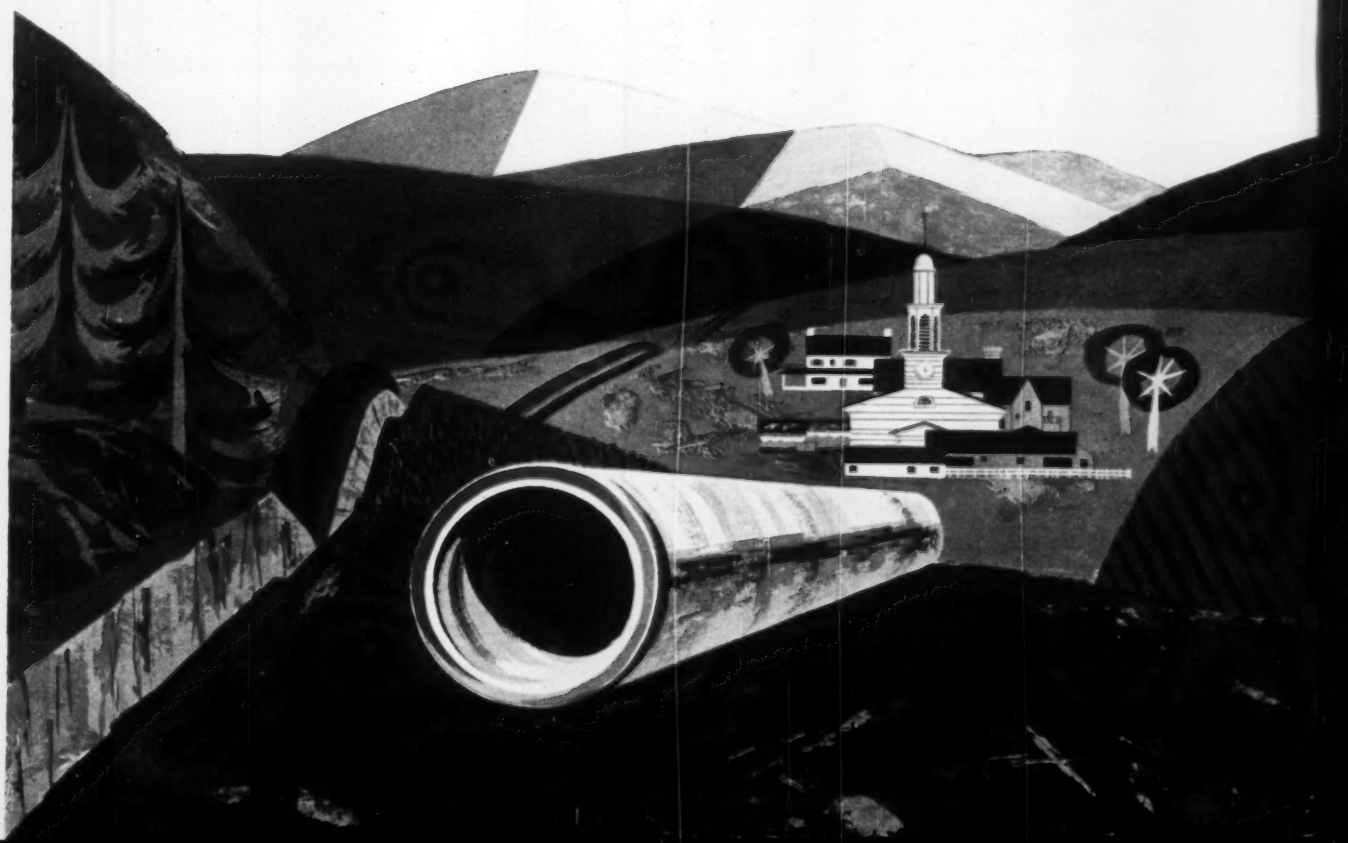

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